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By RALPH A. BRAM

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CLASSIFICATION OF CULEX SUBGENUS CULEX IN THE NEW WORLD (DIPTERA: CULICIDAE)[1]

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A synopsis of the mosquitoes of the world by Stone et al. (1959) with supplements by Stone (1961, 1963) listed 63 species in the *Culex* subgenus *Culex* from the New World. The present study assigns 61 species to the subgenus and lists 3 unrecognized species. In this study four species are described as new, five species are revalidated, one subspecies is elevated to species rank, and 11 species are placed in synonymy.

This study would not have been possible without the enthusiastic guidance and support received from several outstanding culicidologists. I take pleasure in extending most sincere gratitude and thanks to the following persons: Dr. William E. Bickley, Professor and Head, Department of Entomology, University of Maryland; Dr. Alan Stone, Entomology Research Division, Agricultural Research Service, United

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States Department of Agriculture; and Dr. Oswaldo P. Forattini, Professor Associado, Departamento de Parasitologia, Universidade de São Paulo. I am indebted to the following individuals who materially contributed to this study by supplying specimens for examination or generously sharing their knowledge: Dr. P. F. Mattingly, Dr. T. H. G. Aitken, Dr. M. Bates, Dr. T. Belterman, Dr. O. H. Casal, Dr. E. I. Coher, Dr. R. R. Correa, Dr. P. Cova Garcia, Dr. L. Vargas, and Dr. J. F. G. Clarke. I wish to dedicate this study to my wife.

The major portion of material examined during the course of this study is housed in the U.S. National Museum (USNM). Additional specimens from collections in the following institutions were also consulted: Trinidad Regional Virus Laboratory, Trinidad (TRVL); Instituut Voor Tropische Hygiene en Geographische Pathologie, Amsterdam (ITHGP); Instituto National de Microbiologia, Buenos Aires (INM); Serviço De Erradicação da Malária e Profilaxia da Doença de chagas, São Paulo (SEMPDC); Division de Endemias Rurales, Maracay (DER); Universidade de São Paulo, São Paulo (USP); Centro Ecuatoriano de Investigaciones Entomologicas (located in the USNM); and Instituto de Salubridad y Enfermedades Tropicales, Mexico, D. F. (ISET).

Since this manuscript was originally submitted for publication, Forattini (1965) has published a monograph of the culicine mosquitoes of the new world utilizing, in part and with the author's permission, the classification of Bram (1964). Unfortunately, Dr. Forattini was not aware that the present manuscript had not yet been published in accordance with the International Code of Zoological Nomenclature and, therefore, attributed *Culex alani*, *C. bickleyi*, *C. covagarciai*, and *C. oswaldoi* to Bram (1964). Since Forattini (1965) was the first author to publish these species in accordance with the Code, the names must be credited to him. However, since Forattini saw no specimens and did not designate holotypes or type localities for these species, the original material upon which the species were based by Bram (1964) should be recognized as the type series for the species. Similarly, synonymy listed as new in this publication was actually first published by Forattini (1965), but reasons for proposing the synonymy are included in this paper.

New World synonymy is listed under each species. Complete references may be found in Stone et al. (1959) and Stone (1961, 1963).

Zoogeography

Little is known about the zoogeography of the family Culicidae. This is due mainly to reasons enumerated by Bates (1949), who

observed that (a) the few fossil mosquitoes that are known are of little help in understanding the past history of the group; (b) the various taxonomic categories are not sufficiently defined to form a sure foundation for generalization; and (c) a map showing distribution of various species is apt to reflect the distribution of the collectors more than the distribution of the insects. We should also note that, at least in the Neotropical region, sufficient biological data is not available in many instances to permit intelligent interpretations of distributional patterns. Despite these limitations, noteworthy contributions to mosquito zoogeography have been made by Lane (1943, 1944), Bates (1949), Mattingly (1962), and Belkin (1962).

The dominant mosquito genera in the New World, as determined by number of species, are *Culex* and *Aedes*. In the Nearctic region *Aedes* assumes the dominant role with *Culex* being represented by only 26 species (15 of which are both Nearctic and Neotropical). In the Neotropical region *Culex* predominates and is represented by 239 species according to Stone et al. (1959). In no other region is the genus *Culex* so diversified. In the Ethiopian region there are 104 species in the genus. The Oriental region is next in number of species with 88, followed by 33 species in the Palearctic. Within the genus *Culex* the subgenus *Melanoconion* is dominant. It is indigenous to the New World and encompasses 117 species (only eight of which are found in the Nearctic). The subgenus *Culex* is cosmopolitan, but also exhibits a decided concentration in the tropical regions. Only three species of the subgenus, *restuans*, *salinarius*, and *tarsalis*, are indigenous to the Nearctic region. Forty-nine species are indigenous to the Neotropical region, and nine species are found in both Nearctic and Neotropical regions. The following discussion treats zoogeographical patterns of the subgenus *Culex* in the New World.

The three species of *Culex* (*Culex*) native to the Nearctic region present interesting patterns, since they are related to widely distributed Neotropical species. *Culex restuans* is found throughout North America, ranging from the Gulf of Mexico into Canada and from California to the east coast (Carpenter and LaCasse, 1955). Studies of the male terminalia indicate that it has close affinity with *C. laticlasper*, a species described from the Panamanian Isthmus. Another species found in the complex, *C. acharistus* is distributed from Columbia south to Llanquihue, Chile and eastward to Argentina and Brazil.

Culex salinarius, also indigenous to the Nearctic region, occurs in the eastern United States, southeastern Canada, extends westward to Utah, and dips into Mexico (Carpenter and LaCasse, 1955). Studies of male terminalia indicate that it has close affinities with *C. archegus*, which is found on the northwest coast of South America,

and *C. dolosus* and *C. spinosus*, species found in the central portion of South America.

Culex tarsalis ranges from southwestern Canada through the western, central, and southern United States and into Mexico (Carpenter and LaCasse, 1955). This species demonstrates close affinity with *C. abnormalis* which extends from Colombia to central Brazil.

All three of these species, indigenous to the Nearctic region, demonstrate considerable extensions into Mexico but none has been reported from Guatemala southward. Thus, it appears that all three species have close affinities with, and that their ancestors may have been part of, the Neotropical fauna. The affinities of these three Nearctic species with the Neotropical fauna could be explained by Belkin's (1962) hypothesis of the intercontinental origin of new types. This hypothesis suggests that the phylad originated on an island in the intercontinental area, dispersed to both hemispheres initially, and then continued evolving independently.

The two principal intercontinental areas which Belkin (1962) considered as primary centers of origin are the Indo-Pacific area between Eurasia and Australia, and the American Mediterranean between the North and South American continents (ibid., vol. 2, map on p. 18). It was his contention that these areas are the most likely places for the origin and evolution of new major types of mosquitoes. Both are characteristically unstable regions where major orogenic belts of adjacent continents meet, intersect, form arcs, or otherwise have complex relationships. Thus, in the course of island formation, great environmental stress would be imposed on the surviving populations and these would be greatly reduced and isolated. Under such conditions there would be an ideal opportunity for the quick fixation of new adaptive types of organisms. Examination of distributional patterns in the subgenus *Culex* indicates that the American Mediterranean is probably the primary center of origin. Forty-seven of the 61 species considered in this study are found within the boundaries of this area as delimited by Belkin.

Several endemic species are found on the Antillean and Bahamanian islands. Both *Culex scimitar* and *C. sphinx* have been reported only from the Bahamas and both show strong affinities in the male terminalia to *C. nigripalpus*, which is distributed throughout the southern Nearctic and American Mediterranean areas. *C. duplicator* is endemic to the island of Hispaniola and demonstrates affinity with *C. saltanensis*, a species with a distribution range from Venezuela to northern Argentina. *C. finlayi* has been reported only from Cuba. Although the male terminalia is somewhat unique, there seems to be some affinity with the more widely distributed *C. chidesteri*. *C. bahamensis*, a unique species demonstrating affinity with the subgenus

Melanoconion, is restricted to the Caribbean Islands and the southern tip of Florida.

The Central American isthmus also possesses endemic species. *Culex delys* and *C. laticlasper* are known only from the Panama Canal Zone. *C. stenolepis* is known from the state of Veracruz, Mexico, and Costa Rica; it exhibits affinities with *C. thriambus*, a species which extends into Colombia. *C. pinarocampa* has been reported from four states in southern Mexico and from Panama; however, considering our present knowledge of distributions, none of these Central American forms can definitely be considered as truly endemic.

In the subgenus *Culex* it appears that the intercontinental islands of the American Mediterranean area did not assume the dominating role as a center of origin but, in general, were the recipients of the South American fauna. Although somewhat reduced in number of species, the Trinidadian fauna is typical of the fauna of the adjacent South American continent. The continental fauna is also reflected to some degree in the fauna of the other Carribean islands. This tendency towards a South American fauna (in contrast to a Central American, North American, or endemic fauna) is readily explained by consideration of prevailing surface winds of the Atlantic Ocean and typical tracks of tropical storms. Darlington (1957, fig. 8) outlined the course of the prevailing winds. Examination of these figures revealed that the winds and storms originate in the Atlantic Ocean and develop in a circular, clockwise direction, touching the South American continent and proceeding through the Caribbean or towards the Central American isthmus. The winds would have probably served as the primary agents of dispersal.

Lane (1943) reviewed the geographical distribution of the mosquito tribe Sabethini. In this study he recognized five centers of endemism and dispersal in the Neotropical region as well as two negative areas in which no Sabethines were found (ibid., map 8, p. 425). In a subsequent study, Lane (1944) suggested that the tribe Anophelini also adhered to these centers of endemism and dispersal. Belkin's American Mediterranean area encompasses Lane's Central American, Incasic, and Cariba centers as well as the Caribbean islands. This area is considered the primary center of dispersal in the New World. In the subgenus *Culex* the most prominent secondary center of dispersal corresponds generally to the Patagonian area. Species included in this area are: *Culex apicinus*, a highly adapted species with rather independent tendencies; *C. articularis*, also somewhat unique; *C. brethesi* and *C. acharistus*, species showing affinities with the *restuans-laticlasper* complex; *C. lahillei*, which shows affinity with *C. foliaceus;* and *C. tramazayguesi*, a unique species of unknown affinity. Another secondary center of dispersal might well be Lane's negative center 4.

Species which appear to be endemic to this area include *C. foliaceus*, *C. oswaldoi*, and *C. maxi*, which extends through the central plateau to northern Argentina. Lane's center 5 (the Tupi area) is represented by four endemic species: *C. carcinoxenus*, *C. lygrus*, *C. renatoi*, and *C. acharistus;* however, each of these species is known only from the type locality. This limited distribution is probably a reflection of the close proximity of this area to culicidologists working at the University of São Paulo. The Central Plateau area (or Lane's center 3) exhibits two endemic species, *C. mauesensis* and *C. airozai*, which are also known only from their type localities. Again, this does not necessarily represent a recognizable center of endemism.

Several species of Neotropical *Culex* (*Culex*) have rather broad areas of distribution which are worthy of consideration. *Culex chidesteri* extends from Mexico southward to northern Argentina, being restricted to the western half of the continent. Interestingly enough, this species has been found on the island of Jamaica but has not been reported from any of the other Caribbean islands. *C. corniger* is distributed from Mexico throughout the northern half of South America and southward to Argentina on the east coast. It is also found throughout the Caribbean. *C. mollis* extends from Mexico south to northern Argentina and is apparently a common species. In the Caribbean, however, it has only been reported from the island of Trinidad which typically exhibits a continental fauna. *C. abnormalis* and *C. saltanensis* seem to be restricted to a central, north-south band on the South American continent. With the exception of Central America and the Caribbean islands, *C. surinamensis* is distributed throughout the American Mediterranean area and extends into the central plateau. *C. declarator* ranges from southern Texas throughout the American Mediterranean, but is limited in the Caribbean to the Lesser Antilles. It also extends eastward to the state of Pernambuco, Brazil. A very closely related species, *C. bidens*, is more southern in distribution ranging from central Argentina northward through the east coast and central plateau areas and extending into Venezuela. It has not been reported from the west coast of South America and is also generally absent from the American Mediterranean. Martinez Palacios (1952) did report this species from six southern and central states of Mexico. The *C. coronator* complex of species presents an interesting distributional pattern, which will be discussed in detail under the various species. In general, however, *C. coronator* and *C. usquatus* extend from Texas southward to northern Argentina, but are absent from the west coast of South America and the Caribbean islands. *C. usquatissimus*, *C. ousqua*, *C. camposi*, and *C. covagarciai* are distributed in varying degrees within the American Mediterranean.

These patterns, then, do not indicate distinct centers of endemism

and distribution in the subgenus *Culex* as was found by Lane (1943, 1944) for the tribes Sabethini and Anophelini. Rather, the distributional patterns of the various species indicate several broad faunistic areas as suggested by Belkin (1962) for the entire family Culicidae. The American Mediterranean exhibits the greatest number of species of any area, as well as the largest number of endemic species. Although suggestions of subpatterns seem to exist, the general area is considered the primary center of distribution. The Patagonian area was recognized by both Lane and Belkin (in this case as the Patagonian-South Chilean area) and in the subgenus *Culex* demonstrates a distinctively unique fauna. In this subgenus the Patagonian area would seem to represent a compromise between the concept of the areas presented by Lane and Belkin. The remaining area of South America seems best considered under Belkin's broad Neotropical area. In this area suggestions of subpatterns also exist, but sufficient data is not presently available to confirm or delimit these possibilities.

In summary, examination of distributional patterns reveals several broad faunal areas of New World *Culex* (*Culex*). The entire Nearctic region exhibits only three endemic species and possesses nine more species which are also found in the Neotropical region. The Neotropical region may be subdivided into three faunal areas: (1) the American Mediterranean, which is considered the primary center of origin and distribution; (2) the Patagonian, which is confined to the west coast and southern tip of the continent, and which exhibits a unique fauna; and (3) the Neotropical, which includes the rest of the South American continent. These faunal areas, modified after Lane (1943) and Belkin (1962), are outlined in figure 1. Additional subpatterns within these areas are suggestive, but more distributional data is required to confirm and delimit these secondary features.

Terminology

MALE TERMINALIA.—The terminology followed in this study is basically that of Carpenter and LaCasse (1955). The one exception to this is in the male terminalia. A wide variety of terms has been used to describe the structures of the male terminalia and few authors agree on standard terms in the subgenus *Culex*. Table 2 lists the terminology used by eleven different authors to describe the structures of the mesosome in the *Culex* subgenus *Culex*. This table is by no means complete since, as indicated by Freeborn (1924), it is impossible to produce an accurate synonym list for the nomenclature of the different parts without consulting the original descriptions of all species and all monographic works. In respect to male terminalia,

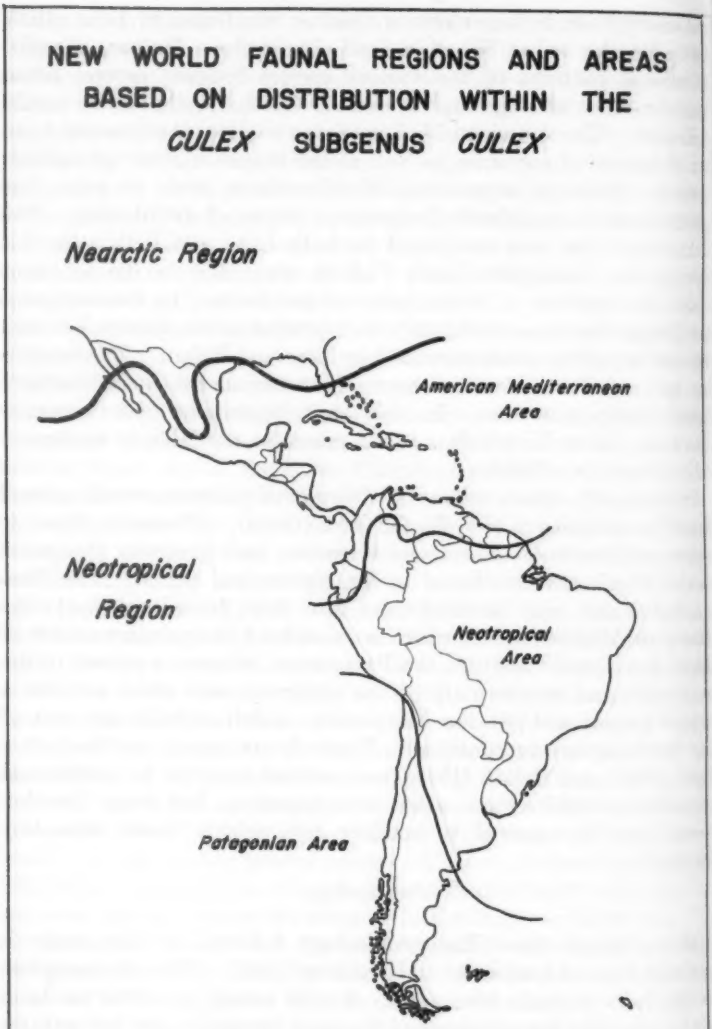

FIGURE 1.—New World faunal regions and areas based on distribution within the *Culex* subgenus *Culex*.

the nomenclature of Freeborn and Bohart (1951) is utilized throughout this study. Following is a brief discussion of major morphological characters of the male terminalia utilized in this study. Each structure discussed is included in diagrams of each species.

Tenth sternites (XS): These structures were regarded by Christophers and Barraud (1923) as the cerci united with the anal lobe, but in general taxonomic nomenclature they are recognized as sternites. In the subgenus *Culex* the tenth sternites are crowned with a tuft of spines and it is this character that is considered important. Three basic arrangements of tufts are found and can be readily identified: (1) spines sparse and weak; (2) spines dense and rather strong; and (3) spines dense and strong apically, but with the spines on the outer lateral margins spatulate and rather scalelike in appearance. It should be noted that all species exhibiting arrangement "(1)" do not possess a leaf on the apical lobe of the basistyle; however, the reverse is not true.

Ventral cornu (VC): Stone (personal communication, 1962) considered this structure to represent a modification of the apical tooth of the median process of the mesosome. Two rather distinct configurations can be recognized. Most species possess a dentiform ventral cornu, although the structure may assume a variety of shapes and sizes in relation to the teeth of the median process of the mesosome. A second form exists where the ventral cornu is very large, rounded, and exhibits rugulose outer margins.

Median process of the mesosome (MP): The precise number of teeth on the median process of the mesosome varies somewhat, even within a species. Three recognizable situations, however, seem to exist: (1) the teeth are absent or are, at most, one or two in number; (2) the teeth are distinctly separated and range in number from three to approximately 10; and (3) the condition in which a large number of conglomerate teeth is present.

External process (EP): This structure issues from the center of the mesosome and assumes various shapes and sizes in relation to the median process of the mesosome. The structure is present in all species of the subgenus, but is difficult to distinguish when the terminalia is mounted in the everted position.

Basal arm of the mesosome (BA): This structure generally issues from the mesosome as a short, straight, bluntly rounded limb. In some species the structure may be completely absent, and in other species it may be bent at an acute angle so as to be directed posteriorly.

Apical lobe of the basistyle (AL): There is great variation in setal arrangement on the apical lobe, as well as variations in the conformation of the lobe, itself. Lane (1953) conveniently divided the subgenus into two groups, depending on whether or not the apical lobe

possessed a leaf-shaped seta; however, this division seems to represent an oversimplification of the complex interrelationships of terminalic structures. The basic setal arrangement on the apical lobe appears to be: three strong, basal rods followed by a leaf-shaped seta; a straight, pointed seta; and a curved, pointed seta. Variations to this basic pattern range widely from a simple group of straight, pointed setae in *Culex usquatus* to elaborate modifications and setal arrangements in *C. apicinus*.

FEMALE CHARACTERS.—Historically, adult female mosquitoes have been extremely difficult to identify accurately. This is due mainly to the limited number of distinctive characters, intraspecific variation of characters, and similarity of closely related species. In the subgenus *Culex* primary taxonomic characters are concerned with body ornamentation and scale color patterns. In this study 13 different colorational characters have been selected and are listed in table 1. For many of the species, positively determined material was not available (due to lack of associated, individual rearings) and in these cases reference was made to the original descriptions. These characters were not incorporated into a formal key because, for most species, data on intraspecific variation are not available at the present time. Terminology used in describing these colorational characters is that of Carpenter and LaCasse (1955).

LARVAL CHARACTERS.—In the larval stage many stable morphological structures are available for use as taxonomic characters. As in the case of female characters, the terminology utilized in describing these characters is that of Carpenter and LaCasse (1955). Morphological larval characters utilized in this study are as follows:

Antenna: In all but two species examined the antennae are constricted near the outer third, beyond the insertion of the antennal tuft. Degree of spiculation of the antennal shaft is also utilized as a taxonomic character.

Head hairs: The arrangement, length, and condition of the four primary head hairs are characteristic. The following head hairs are utilized as taxonomic characters: postclypeal head hair 4; upper frontal head hair 5; lower frontal head hair 6; and preantennal head hair 7.

Mentum: This structure is the strongly sclerotized and pigmented, toothed plate of the labial-hypopharyngeal complex. It is characteristic in the number and conformation of the lateral teeth.

Integument: The presence or absence of spicules on the thoracic and abdominal integument is frequently diagnostic.

Comb: This structure is a row or patch of enlarged specialized spicules in the middle of each side of the eighth abdominal segment.

The general arrangement of the comb scales is frequently utilized, as well as the number and conformation of the individual scales.

Siphon: The air tube of the typical nonanopheline mosquitoes; morphologically includes part of the abdominal segments VIII and IX. Several features of the siphon are utilized as taxonomic characters.

Siphonal index: The ratio between the length of the siphon and the basal width.

Siphonal tufts: Pairs of setae inserted on the siphon. The number, location, and condition of the siphonal tufts are diagnostic.

Pecten: A paired, comblike row of spiculate teeth along the ventrolateral border of the siphon. The number, arrangement and conformation of individual teeth is diagnostic.

L/S ratio: The ratio of the length of the siphon to the dorsal length of the saddle. This ratio was originally proposed by Colless (1957) and is used as a supplementary character in the larval key.

Keys

In this study emphasis has been placed on characters of the male terminalia because of the scarcity of material, particularly larval skins associated with adults, and because many species are known only from the male terminalia. Of the 61 species recognized in this study, 59 have been included in the key to male terminalia. *Culex delys* is known only from the female and *C. pseudojanthinosoma* is known only from the female and a description of the larval stage. A key to New World subgenera of the genus *Culex* based on the male has been constructed utilizing many of the characters suggested by Foote (1954).

Due to the scarcity of reliable data, the key to larvae is extremely tentative. In 18 species the larval stage is unknown. Descriptions of the larvae in many other species are incomplete or questionable. A thorough understanding of larval morphology and affinities awaits future individual rearings. Only by this technique can correlations between immature and adult stages be conclusively established. A list of larval characters separating the subgenus *Culex* from other New World subgenera of the genus was prepared instead of a formal key, because some difficulty was encountered in separating the subgenera *Carrollia* and *Microculex*.

Morphological and colorational characters of adult females in the subgenus *Culex* are extremely difficult to differentiate. As pointed out by Lane (1953), a key utilizing adult females serves only to approximate species because the characters are variable. In this study few species were represented by a suitable sample of positively determined specimens, and the amount of material obtained from

individual rearings was very limited. Original descriptions of adult females are often vague and different authors emphasize different morphological and colorational aspects. Therefore, no attempt was made to construct a formal key incorporating adult female characters. However, a table of salient female characters has been prepared as table 1.

Key to Subgenera of New World *Culex* Based on the Male

1. Tenth sternite crowned with a tuft of predominently pointed setae; spatulate setae may be present on the outer lateral margins 2
   Tenth sternite crowned with a row of spatulate setae 4
2. Tenth sternite without a basal arm 3
   Tenth sternite with a basal arm present . . . . . **Culex**
3. Ventral cornu present on the mesosome . . . . . **Lutzia**
   Ventral cornu absent . . . . . **Neoculex**
4. Palpus longer than the length of the proboscis by at least the length of the last palpal segment . . . . . **Melanoconion Mochlostyrax**
   Palpus no longer than the length of the proboscis 5
5. Abdomen without basolateral metallic spots 6
   Abdomen with basolateral metallic spots . . . . . **Carrollia**
6. Mesosomal plate without retrorse teeth 7
   Mesosomal plate with a pair of retrorse teeth . . . . . **Microculex**
7. Apical lobe of the basistyle extended into a single, medially placed, thumb-like projection . . . . . **Eubonnea**
   Apical lobe of the basistyle not as above, divided into a distal and proximal section . . . . . **Aedinus**

Key to Species of New World *Culex* (*Culex*) Based on Male Terminalia

1. Apical lobe of the basistyle without a broadened leaf 2
   Apical lobe of the basistyle with at least one broadened leaf 18
2. (1) Tenth sternite crowned with a dense tuft of strong spines 3
   Tenth sternite crowned with a sparse tuft of fine spines 4
3. (2) Dististyle enlarged medially; apical lobe of the basistyle extended into a tuberculiform projection terminating in a strong apical rod and possessing a distal seta and a basal seta . . . . **habilitator**
   Dististyle not enlarged medially; apical lobe of the basistyle bearing only three strong, obtuse rods and several normal setae . **tramazayguesi**
4. (2) Median process of the mesosome bearing 10 of more conglomerate teeth 5
   Median process of the mesosome bearing less than 10 distinctly separated teeth 9
5 (4) Apical lobe of the basistyle bearing two obtuse and one hooked rod, as well as additional setae; apical third of the dististyle minutely annulate . . . . . **bahamensis**
   Apical lobe of the basistyle not as above; apical third of the dististyle not annulate 6
6. (5) Ventral cornu pointed, without rugulose outer margins 7
   Ventral cornu rounded, rugulose on outer margins . . **maracayensis**
7. (6) Tenth sternite with pilosity on the lateral margins 8
   Tenth sternite without pilosity on the lateral margins . . **bonneae**

8. (7) Ventral cornu pointed and bent at the outer third so as to be directed posterolaterally; external process evenly tapered to an obtuse termination . . . . . **saltanensis**

Ventral cornu serrate terminally; external process broad at the basal ⅔, then sharply indented on the lateral edge and tapered; endemic to the island of Hispaniola . . . . . **duplicator**

9. (4) Ventral cornu more or less dentiform and short, not distinctly separated from the teeth of the median process 10

Ventral cornu long and slender, directed laterally, and distinctly separated from the teeth of the median process (*coronator* group) . 13

10. (9) Apical lobe of the basistyle with two sections; the basal section with three rods, the distal section with approximately six setae 11

Apical lobe of the basistyle with about six subequal setae 12

11. (10) Ventral cornu clavate, located just above the teeth of the median process . . . . . **brevispinosus**

Ventral cornu dentiform, located close to the teeth of the median process . . . . . **surinamensis**

12. (10) Ventral cornu large and distinct; median process bearing about four teeth; basal process directed posteriorly . . . . . **oswaldoi**

Ventral cornu small and dentiform; median process bearing about eight teeth; basal process directed anteriorly . . . . . **maxi**

13. (9) A group of short setae located at the apex of the basistyle 14

A group of long setae located at the apex of the basistyle; these setae reach to at least the midpoint of the dististyle 16

14. (13) Apical lobe of the basistyle undivided 15

Apical lobe of the basistyle divided into a large proximal lobe and a small distal tubercle; the proximal lobe possesses a group of approximately 10 subequal setae; the distal tubercle possesses four or five subequal setae . . . . . **ousqua**

15. (14) Apical lobe of the basistyle possessing two or three rods basally followed by 5 to 15 setae . . . . . **coronator**

Apical lobe of the basistyle extended into a thumblike projection possessing the following appendicles: one short, very broad rod, two long prominently hooked rods, and several subequal, hooked setae. **covagarciai**

16. (13) Basistyle with a small tubercle located distad of the apical lobe and possessing from one to five setae 17

Basistyle without a small tubercle distad of the apical lope; apical lobe of the basistyle possessing from 10 to 15 setae . . . . . **usquatus**

17. (16) Apical lobe of the basistyle possessing three rods and one seta; small tubercle distad of the apical lobe possessing four or five setae. **usquatissimus**

Apical lobe of the basistyle possessing approximately 10 setae; small tubercle distad of the apical lobe possessing one or two strong setae . . . . . **camposi**

18. (1) Median process of the mesosome projected into a strong extension upon which is located a sphincter-form ring . . . . . **finlayi**

Median process of the mesosome not as above 19

19. (18) Ventral cornu absent; teeth of the median process absent or greatly reduced in size and number; external process very broad and prominent, slightly curved laterally 20

Ventral cornu present, dentiform or rugulose and rounded; teeth of the median process not reduced in size; external process normal . . . 24

20. (19) Basal arm of the tenth sternite long and curved 21
Basal arm or the tenth sternite short and straight . . . . . **pipiens**
21. (20) Apical lobe of the basistyle with three rods, a leaf, a hooked seta, and a straight seta 22
Apical lobe of the basistyle with three rods, a leaf, and a straight seta . . . . . **brethesi**
22. (21) Apical third of the dististyle without minute annulations 23
Apical third of the dististyle with minute annulations (this character is best seen under oil immersion or phase contrast) . . . **acharistus**
23. (22) Hooked accessory seta on apical lobe of the basistyle unusually strong and curved; median process of the mesosome with about two small, lightly sclerotized denticles . . . . . **laticlasper**
Hooked accessory seta on apical lobe of the basistyle not unusually strong, gently curved; median process of the mesosome completely without teeth . . . . . **restuans**
24. (19) Apical lobe of the basistyle with two leaves present (broadly modified setae are not here considered as leaves) 25
Apical lobe of the basistyle with only one leaf present 27
25. (24) Dististyle not annulate terminally 26
Dististyle minutely annulate at the terminal end . . . **diplophyllum**
26. (25) Dististyle with a distinct enlargement at the apex; apical lobe of the basistyle bearing three rods in addition to the two leaves . . **foliaceus**
Dististyle without a distinct enlargement at the apex; apical lobe of the basistyle bearing three rods and a hooked seta in addition to the two leaves . . . . . **lahillei**
27. (24) Tenth sternite crowned with short, pointed spines at the apex and short, spatulate spines on the outer lateral margins 28
Tenth sternite crowned with short, pointed spines; spines on the outer lateral margins not spatulate 33
28. (27) Ventral cornu pointed and dentiform 29
Ventral cornu rounded and rugulose 30
29. (28) Apical lobe of the basistyle with three blunt rods, a straight, pointed seta, a straight seta, and a narrow leaf . . . . . **tarsalis**
Apical lobe of the basistyle with a blunt rod, two hooked rods, a normal oblongo-ovatum leaf, two or three slender hooked setae, and one slender seta . . . . . **abnormalis**
30. (28) Dististyle not minutely annulate at the terminal end 31
Dististyle minutely annulate at the terminal end; central portion of the dististyle scimitar-like in shape . . . . . **scimitar**
31. (30) External process evenly tapered; not rounded apically 32
External process gradually curved apically so that the point is directed laterally . . . . . **chidesteri**
32. (31) Apical lobe of the basistyle with a blunt rod, two hooked rods, an accessory seta, and a normal leaf . . . . . **nigripalpus**
Apical lobe of the basistyle with a pointed rod, two hooked rods, three setae, and a narrow leaf . . . . . **sphinx**
33. (27) Ventral cornu rounded, rugulose on outer margins 34
Ventral cornu pointed and not rugulose 37
34. (33) Apical lobe of the basistyle with five appendicles: Three rods, an accessory seta, and a leaf 35
Apical lobe of the basistyle with six appendicles: Three rods, a hooked seta, a straight seta, and a leaf 36

35. (34) External process with a prominent additional sclerite on the inner margin . . . . . **thriambus**
External process without an additional sclerite on the inner margin. **stenolepis**

36. (34) External process gradually tapering to a point and bent so as to be directed laterally . . . . . **interrogator**
External process not bent so as to be directed laterally; inner edge of the external process sharply angulate at approximately the outer third. **peus**

37. (33) Apical lobe of the basistyle with three rods, a normal, prominently hooked seta, a straight seta, and a normal leaf 46
Apical lobe of the basistyle without the above number and/or type of appendicles 38

38. (37) Apical third of the dististyle minutely annulate 39
Apical third of the dististyle not minutely annulate 40

39. (38) Tenth sternite robust, the basal process very short and stout; apical lobe of the basistyle with a long, serrate leaf, a cleft, heavily sclerotized rod, and three hooked rods; a densely setose protuberance below the apical lobe . . . . . **apicinus**
Tenth sternite normal, the basal process long and curved; apical lobe of the basistyle with an obtuse rod, two hooked rods, a short seta, an unusually hooked spine, and a leaf . . . . . **articularis**

40. (38) Apical lobe of the basistyle with three rods, two serrate, plumose setae, a hooked seta, a leaf, and a straight seta . . . . . **levicastillioi**
Apical lobe of the basistyle not as above 41

41. (40) Apical lobe of the basistyle with three rods, a straight seta, and a leaf 42
Apical lobe of the basistyle not as above 43

42. (41) External process narrow, pointed, and not reaching posteriorly to the ventral cornu; median process of the mesosome bearing more than 10 conglomerate teeth . . . . . **corniger**
External process normal in breadth, reaching posteriorly to at least the ventral cornu; median process of the mesosome bearing less than 10 distinctly separated teeth . . . . . **carcinoxenus**

43. (41) Apical lobe of the basistyle with one rod, a leaf, and a seta . . **airosai**
Apical lobe of the basistyle with more than three appendicles . . 44

44. (43) Apical lobe of the basistyle distinctly divided into two sections, the basal section tuberculiform and possessing three rods, the distal section possessing one seta and a leaf . . . . . **inflictus**
Apical lobe of the basistyle not divided into two distinct sections as above 45

45. (44) Apical lobe of the basistyle with three rods, two small setae, a large hooked seta, a leaf, and a straight seta . . . . . **secutor**
Apical lobe of the basistyle with one blunt rod, two hooked rods, two setae, and a leaf; a minute seta may also be next to the leaf . **janitor**

46. (37) Ventral cornu not greatly enlarged, not appreciably separated from the teeth of the median process 47
Ventral cornu T-shaped, greatly enlarged, and distinctly separated from the teeth of the median process . . . . . **mollis**

47. (46) Basal process bent at an acute angle so as to be directed posteriorly . 48
Basal process not bent at an acute angle; the basal process may, however, gradually curve posteriorly and terminate in a sharp point . 52

48. (47) External process gradually tapering to a point, with a slight bulge on the middle of the inner surface 49
External process very broad on the apical fourth . . . . . **alani**
49. (48) External process evenly tapered to a pointed tip; restricted to the Neotropical region 50
External process with a prominent knob midway on the inner surface; restricted to the Nearctic region . . . . . **salinarius**
50. (49) Basal process rather robust, pointed; reaching at most to the middle of the median process of the mesosome 51
Basal process robust basally, but long and slender apically; reaching almost to the ventral cornu . . . . . **spinosus**
51. (50) Ventral cornu clavate; basal arm of the tenth sternite moderate in length, gently curved . . . . . **archegus**
Ventral cornu dentiform; basal arm of the tenth sternite very long, prominently recurved . . . . . **dolosus**
52. (47) Basal process bluntly rounded distally 53
Basal process sharply pointed distally, occasionally with an auxillary point directed posteriorly . . . . . **bickleyi**
53. (52) Median process of the mesosome with about 10 or more teeth . . . 54
Median process of the mesosome with about seven or less teeth . . 55
54. (53) Apical lobe of the basistyle with three hooked rods, a hooked seta, a straight seta, and a leaf . . . . . **renaiai**
Apical lobe of the basistyle with one blunt rod, two hooked rods, a hooked seta, a straight seta, and a leaf . . . . . **mauesensis**
55. (53) External process normal in size or greatly reduced, gradually tapered to a posteriorly directed point 56
External process large, evenly bent on the outer fourth so that the apical point is directed laterally . . . . . **lygrus**
56. (55) Apical lobe of the basistyle with three hooked rods, a hooked seta, a straight seta, and a leaf; ventral cornu dentiform 57
Apical lobe of the basistyle with one blunt rod, two hooked rods, a hooked seta, a straight seta, and a leaf; ventral cornu clavate. **pinarocampa**
57. (56) External process of the mesosome greatly reduced and lightly chitinized; hooked accessory seta on the apical lobe of the basistyle a complex flattened filament 58
External process of the mesosome normal in size and normally chitinized; hooked accessory seta on the apical lobe of the basistyle a simple, hooked structure . . . . . **erythrothorax**
58. (57) Individual teeth of the median process slightly curved, robust, and having somewhat convex sides . . . . . **declarator**
Individual teeth of the median process not curved, the sides straight and directed to a sharp point . . . . . **bidens**

Larval Characters Distinguishing the Subgenus *Culex* in the New World

1. Labrum not produced in front; mouthbrushes not thickened and in a compact lateral group (fig. 2*a*).

The predaceous subgenus *Lutzia* is characterized by having the labrum produced in front, strongly developed, and possessing stout denticles; mouthbrushes are thickened and inserted in a compact group laterally (fig. 2*b*).

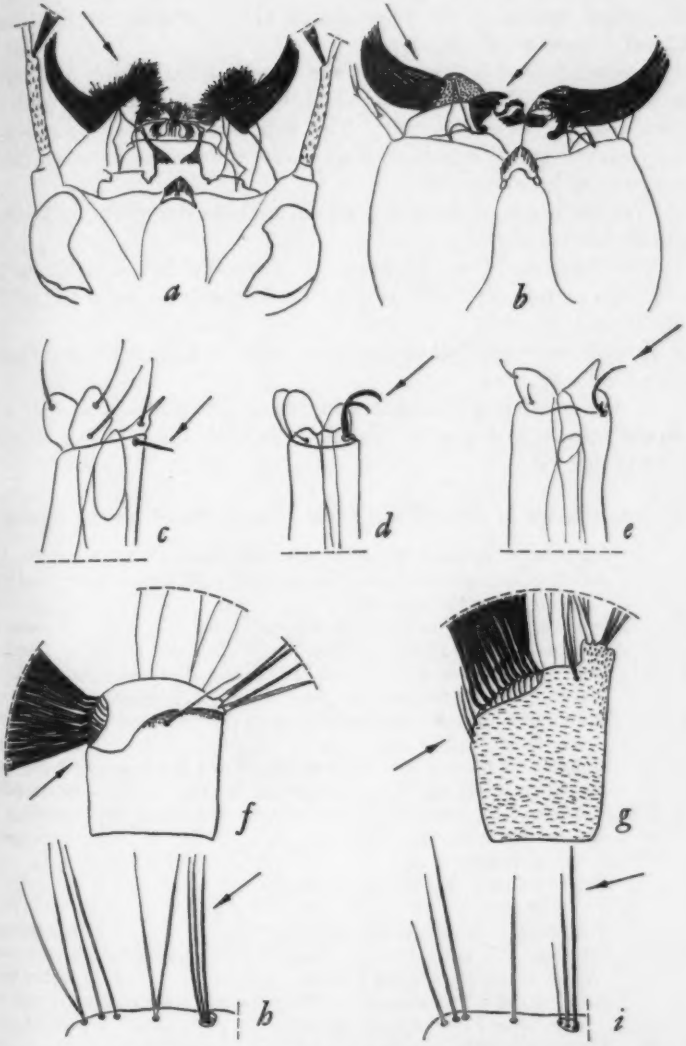

FIGURE 2.—Larval characters distinguishing the subgenus *Culex* in the New World. Head: *a*, *C.* (*Culex*) *declarator* Dyar and Knab, USNM 595; *b*, *C.* (*Lutzia*) *allostigma* Howard, Dyar, and Knab, USNM J92.3. Apex of anal siphon: *c*, *C.* (*Culex*) *declarator*, USNM 595; *d*, *C.* (*Melanoconian*) *mistura* Komp and Rozeboom, USNM Rozeboom 377; *e*, *C.* (*Aedinus*) *americanus* (Neveu-Lamaire), USNM Pratt 1–23–43. Anal segment: *f*, *C.* (*Culex*) *declarator*, USNM 595; *g*, *C.* (*Neoculex*) *derivator* Dyar and Knab. Prothoracic hairs: *h*, *C.* (*Culex*) *declarator*, USNM 595; *i*, *C.* (*Microculex*) *elongatus* Rozeboom and Komp, USNM 407.

2. Apical bristle of air tube absent or, if present, straight and without a basal tooth (fig. 2*c*).

The subgenera *Melanoconion* and *Mochlostyrax* exhibit a strongly curved or hooked apical bristle which has one or two small teeth or hooks near its base (fig. 2*d*). The subgenus *Aedinus* possesses a gently curved apical bristle on the air tube which may have one small barb near its base (fig. 2*e*).

3. Ventral brush of the anal segment without detached hairs proximad of the grid (fig. 2*f*).

The subgenus *Neoculex* possesses a ventral brush with one or more hairs proximad of the grid, on the saddle or between the saddle and the grid (fig. 2*g*).

4. Prothoracic hair 3-P of the same order of magnitude and thickness as 1-P (fig. 2*h*).

In the subgenera *Carrollia* and *Microculex* prothoracic hair 3-P is much thinner and shorter than 1-P, or both 1-P and 3-P may be multiple (fig. 2*i*).

Key to Species of New World *Culex* (*Culex*) Based on the Larvae

1.		Antennae of uniform shape, antennal tuft located near the middle	2
		Antennae constricted beyond the antennal tuft; antennal tuft generally inserted near the outer third	3
2.	(1)	Siphonal tufts not arranged in a line	**corniger**
		Siphonal tufts arranged in a line	**janitor**
3.	(1)	Pecten spines exceeding at least the basal half of the siphon	4
		Pecten spines restricted to the basal third of the siphon	5
4.	(3)	Siphon with all tufts of setae located on the distal half; siphonal tufts very long	**bonnae**
		Siphon with five siphonal tufts arranged in a row except for the subapical tuft; the siphonal tufts normal in length	**interrogator**
5.	(3)	Siphon without strong apical spines (siphonal spicules may be present)	6
		Siphon with strong apical spines	**coronator**
6.	(5)	Siphon pubescent	7
		Siphon glabrous or minutely spiculate	9
7.	(6)	Anal gills four, normal	8
		Two thick, bulbous anal gills present	**bahamensis**
8.	(7)	Siphonal index 5.0 or greater; pubescence conspicuously longer and more dense at the apex of the siphon	**maracayensis**
		Siphonal index less than 5.0; pubescence not conspicuously longer or more dense at the apex of the siphon	**saltanensis**
9.	(6)	Thorax minutely spiculate	10
		Thorax glabrous (the thoracic integument may appear granulose)	21
10.	(9)	Five or more siphonal tufts beyond the pecten	11
		Four or less siphonal tufts beyond the pecten	13
11.	(10)	Apical and subapical pecten teeth not separated from the other pecten teeth; anal segment clothed with minute spicules	12
		Apical and occasionally subapical pecten teeth separated from the other pecten teeth; anal segment clothed with minute setae	**chidesteri**

12. (11) Siphonal index about 6.0; upper and lower frontal head hairs 5 and 6 with three or four branches . . . . . **levicastilloi**
Siphonal index about 4.5; upper and lower frontal head hairs 5 and 6 multiple . . . . . **surinamensis**
13. (10) Four siphonal tufts present 14
Three siphonal tufts present 17
14. (13) Anal gills long and bluntly rounded; apical siphonal tuft single or double 15
Anal gills short and pointed; apical siphonal tuft triple . . **habilitator**
15. (14) Siphonal index 7.5 or less 16
Siphonal index 8.0 or greater. . . . . **covagarciai**
16. (15) Siphonal index 5.5 to 7.0; preantennal head hair 4 with six or seven branches . . . . . **nigripalpus**
Siphonal index 5.2 to 5.6; preantennal head hair 4 with eight to 10 branches . . . . . **scimitar**
17. (13) Siphonal index 6.0 or less 18
Siphonal index 8.0 or greater . . . . . **brevispinosus**
18. (17) Anal gills longer than the length of the anal segment; less than 15 pecten teeth on the siphon 19
Anal gills shorter than the length of the anal segment; about 16 pecten teeth on the siphon . . . . . **sphinx**
19. (18) Basal siphonal tuft located well beyond the pecten 20
Basal siphonal tuft located close to, or within the pecten . . **declarator**
20. (19) Lower frontal head hair 6 triple; L/S ratio about 4.5 . . . . . **bidens**
Lower frontal head hair 6 with four or five branches; L/S ratio about 3.5 . . . . . **mollis**
21. (9) Siphon with five or more siphonal tufts 22
Siphon with less than five siphonal tufts 29
22. (21) Siphonal tufts inserted in a straight line 23
One or more siphonal tufts inserted laterally out of line 25
23. (22) More than five siphonal tufts present on the siphon 24
Five siphonal tufts present on the siphon . . . . . **tarsalis**
24. (23) Six siphonal tufts present; upper and lower frontal head hairs 5 and 6 with four branches . . . . . **secutor**
Eight siphonal tufts present; upper and lower frontal head hairs 5 and 6 with more than four branches . . . . . **finlayi**
25. (22) Siphonal index 6.0 to 8.0 26
Siphonal index 5.0 or less 27
26. (25) Five siphonal tufts present; pecten with 15 teeth . . . . **erythrothorax**
Six siphonal tufts present; pecten with 10 teeth . . . . . **brethesi**
27. (25) Pecten with 10 or more teeth; subapical siphonal tuft with five or less branches 28
Pecten with less than 10 teeth; subapical siphonal tuft with more than five branches . . . . . **apicinus**
28. (27) Upper frontal head hair 5 with five branches, lower frontal head hair 6 with four branches; pecten with about 15 teeth . . . **diplophyllum**
Upper frontal head hair 5 with six branches, lower frontal head hair 6 with seven branches; pecten with about 10 teeth . . . . . **peus**
29. (21) Siphonal index 6.0 or less 31
Siphonal index greater than 6.0 30
30. (29) Postclypeal head hair 4 short, double; pecten restricted to the basal third of the siphon . . . . . **pinarocampa**

Postclypeal head hair 4 short, single; pecten restricted to the basal fourth of the siphon . . . . . **salinarius**

31. (29) Siphonal tufts single, double, or at most with one triple siphonal tuft present 33
Some multiple siphonal tufts present 32

32. (31) Four siphonal tufts present on the siphon; siphonal index about 4.0. **pipiens**
Three siphonal tufts present on the siphon; siphonal index about 3.0. **renaiei**

33. (31) Upper and lower frontal head hairs 5 and 6 three or four branched . . 34
Upper and lower frontal head hairs 5 and 6 multiple 36

34. (33) Siphonal tufts strong, normal in length 35
Siphonal tufts very short and weak . . . . . **foliaceus**

35. (34) Upper frontal head hair 5 four branched, lower frontal head hair 6 triple . . . . . **inflictus**
Upper frontal head hair 5 triple, lower frontal head hair 6 double. **carcinoxenus**

36. (33) Postclypeal head hair 4 with five to seven branches; pecten with about 10 teeth 39
Postclypeal head hair 4 single, double or triple; pecten with about 15 teeth 37

37. (36) Postclypeal head hair 4 short, single 38
Postclypeal head hair 4 short, double or triple . . . . . **restuans**

38. (37) Apical pecten tooth distinctly removed from the other pecten teeth; siphonal tufts single . . . . . **thriambus**
Apical pecten tooth not separated from the other pecten teeth; siphonal tufts double or triple . . . . . **acharistus**

39. (36) Basal and subapical siphonal tufts represented by single setae. **abnormalis**
Basal and subapical siphonal tufts represented by double setae. **archegus**

Larvae of the following species are unknown: *Culex airozai*, *C. alani*, *C. articularis*, *C. bickleyi*, *C. camposi*, *C. delys*, *C. duplicator*, *C. lahillei*, *C. laticlasper*, *C. lygrus*, *C. mauesensis*, *C. maxi*, *C. oswaldoi*, *C. ousqua*, *C. tramazayguesi*, *C. usquatissimus*, and *C. usquatus*.

The following species have not been included in this key due to insufficient information: *Culex dolosus*, *C. pseudojanthinosoma*, *C. spinosus*, and *C. stenolepis*.

Culex (Culex) abnormalis Lane, 1936

FIGURES 3*a*, *b*

Culex (*Microculex*) *abnormalis* Lane, 1936, p. 189.
Culex (*Culex*) *scutatus* Rozeboom and Komp, 1948, p. 396. [New synonymy.]

SYSTEMATICS.—In the original description by Lane (1936) this species was assigned to the subgenus *Microculex*. Subsequently in his monograph, Lane (1953) placed the species in the subgenus *Culex*. Forattini (pers. comm., 1963) re-examined the holotype male and paratype larvae and discovered that the larval paratypes are actually members of the subgenus *Microculex* and that the holotype male properly belongs in the subgenus *Culex*.

Culex scutatus was originally described as a member of the subgenus *Culex* from male specimens along with their associated larval and pupal skins; however, the technique of completely dissecting the male terminalia utilized by the above authors, made comparison with terminalia mounted in the natural closed position difficult. One male paratype was left unmounted, and during this study the male terminalia of this paratype was mounted in the closed position (USNM RB62 718) and forwarded to Dr. Forattini for comparison with the holotype male terminalia of *C. abnormalis*. A comparison of these type specimens revealed that *C. abnormalis* and *C. scutatus* are conspecific (Forattini, pers. comm., 1963).

Characters of the male terminalia indicate some affinity with *Culex tarsalis*, but the arrangement and number of appendicles on the apical lobe of the basistyle are clearly distinctive.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about twice as long as wide; except for the basal fourth, clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed; median rod stout, prominently curved apically, and slightly longer than basal rod; apical rod more slender than median rod, prominently curved apically, and slightly longer than median rod; leaf obovate, moderate in size; accessory setae three in number, two of which are prominently curved, the third being long, straight, and slender. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and approximately five spatulate, scalelike spines on the lateral outer margins; basal arm moderate in length and slightly twisted dorsally; about three cercal setae present in a compact group. External process twisted at the apical third, exceeding the ventral cornu in length. Ventral cornu dentiform, pointed, and close to, but larger than the teeth of the median process. Median process possessing about 10 subequal teeth which become progressively larger apically. Basal process small, straight, and only slightly larger than the teeth of the median process.

Larva: The larva of this species was described by Rozeboom and Komp (1948) as *Culex scutatus*. The paratype larvae described by Lane (1936 and 1953) are actually members of the subgenus *Microculex* and were misassociated with the adult form.

Antennal tuft located in a constriction near the outer third. Preclypeal spines long and slender. Frontal head hair 4 unusually large, with five to nine branches; frontal head hairs 5, 6, and 7 large, with four branches. Mentum with teeth equal in size, about 12 on each side. Abdominal integument glabrous. Comb with about 40 scales

in a triangular patch; each scale fringed laterally and at the apex. Siphonal index about 4.0; with three pairs of siphonal tufts. Pecten with about 10 teeth on the basal third of the siphon; each tooth with several barbs along the ventral margin. Anal segment completely ringed by the saddle; ventral brush comprised of about six multiple tufts.

MATERIAL EXAMINED.—The holotype and two paratype males and their associated larval and pupal skins of *Culex scutatus* in the U.S. National Museum collection. As indicated above, one paratype male of *C. scutatus* has been compared with the holotype male of *C. abnormalis*.

DISTRIBUTION.—The states of Mato Grosso and Goiaz, Brazil and Villavicencio, Meta, Colombia.

Culex (*Culex*) *acharistus* Root, 1927

FIGURES 3*c*, *d*

Culex (*Culex*) *acharistus* Root, 1927, p. 578.

SYSTEMATICS.—This species is similar to *Culex brethesi*, *C. restuans*, and *C. laticlasper*. All four members of this complex demonstrate a reduced mesosome. *C. acharistus*, however, is readily distinguished by the presence of minute annulations on the apical third of the dististyle. This character is best seen under oil immersion or with phase contrast microscopy, and the dististyle must be observed in profile.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong and slightly hooked at the apex; median rod longer and broader than the basal rod, terminating in an apical hook; distal rod longer than, but not as broad as the median rod, terminating in an apical hook; leaf moderate in size, obovate; two accessory setae present, one long, gently curved and pointed, the other very strong, about as long as the leaf, and prominently hooked. Dististyle normal in size, but with minute annulations on the crest of the apical third. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, strongly curved; four cercal setae present in a compact group. External process broad and prominent, gently curved so that the point is directed postero-laterally. Ventral cornu absent. Median process with a suggestion of two lightly sclerotized teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; spiculose basally. Frontal head hairs 5, 6, and 7 multiple. Mentum with about 25 very long teeth. Abdomen glabrous. Comb with a large number of scales in a broad patch; each scale fringed apically. Siphonal index about 3.5; four pairs of siphonal tufts. Pecten with about 14 teeth on the basal third of the siphon; each tooth with several barbs along the ventral margin. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—The lectotype male terminalia, and four adult males and associated terminalia from Argentina, Chile, and Colombia.

DISTRIBUTION.—The type locality of this species is Agua Limpa, Minas Geraes, Brazil. Bachman and Casal (1963) reported the species from the states of Jujuy, Cordoba, Rio Negro, and Neuquen, Argentina. The author has seen specimens in the U.S. National Museum collection from: Tucuman, Argentina; Concepción and Puerto Montt, Chile; and Alban, Colombia.

Culex (Culex) airozai Lane, 1945

FIGURE 5a

Culex (Culex) airozai Lane, 1945, p. 204.

SYSTEMATICS.—This species is easily distinguished from all other members of the subgenus by the reduced number of appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about twice as long as basal width. Apical lobe undivided and possessing a basal, pointed rod, a small obovate leaf, and a straight, pointed accessory seta. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm strongly curved. External process gradually tapering to an obtuse tip; exceeding the ventral cornu in length. Ventral cornu dentiform, only slightly larger than the teeth of the median process. Median process possessing 10 or more conglomerate teeth. Basal process small, straight, and bluntly rounded.

Larva: Unknown.

MATERIAL EXAMINED.—None. Known to the author only from the descriptions and figures of Lane (1945 and 1953).

DISTRIBUTION.—That of the type locality, Paruary River, Amazonas, Brazil.

Culex (Culex) alani Forattini, 1965

FIGURE 3e, *f*

Culex (Culex) alani Bram [sic].—Forattini, 1965, p. 143.

SYSTEMATICS.—This species is a member of the complex of species

in which the basal arm of the mesosome is bent, pointed, and directed posteriorly. It is distinguished by the characteristic and diagnostic external process.

SALIENT CHARACTERS.—Adult female: Unknown.

Male terminalia: Basistyle conical, almost three times as long as the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: basal rod strong, straight and pointed; median and apical rods broader and longer than the basal rod, and terminating in a gentle hook; leaf moderate in size, obovate and possessing minute longitudinal striations; two accessory setae present, one very strong and prominently hooked at the apex, the other more narrow, slightly longer than the leaf, and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in size, distinctly curved; three cercal setae present. External process expanded to an extremely broad distal third, with a blunt point directed posterolaterally; reaching to about the ventral cornu in length. Ventral cornu dentiform, considerably larger than the teeth of the median process. Median process with about seven to 10 distinct, sharply pointed teeth. Basal process rather broad, pointed, and bent so as to be directed posteriorly.

Larva: Unknown.

HOLOTYPE.—An adult male and associated slide mounted terminalia with the following data: Colombia, Lot 152, 11–XII–40, Catera a Gachancipa, 2650 m, Bates; USNM RB62 205; USNM 67547. One paratype adult male and associated slide mounted terminalia with the following data: Colombia, Lot 156, 12–XII–40, Catera a Gachancipa, 2650 m, Bates; USNM RB61 303; I take pleasure in naming this species in honor of Dr. Alan Stone.

MATERIAL EXAMINED.—The holotype and paratype male terminalia.

DISTRIBUTION.—That of the type locality.

Culex (Culex) apicinus Philippi, 1865

FIGURE 4

Culex (Culex) apicinus Philippi, 1865, p. 596.
Culex (Culex) escomeli Brethes, 1920, p. 41.
Phalangomyia debilis Dyar and Knab, 1914, p. 58.
Culex (Culex) alticola Martini, 1931, p. 216. [New synonymy.]

SYSTEMATICS.—Lane (1951) synonymized *Culex alticola* with *C. apicinus*. Subsequently Stone (1956 (1957)) revalidated *C. alticola* after studying the lectotype male in the British Museum. Although Stone conceded that the two species are very similar, he pointed out differences in the leaf and the retrorse process on the apical lobe of the

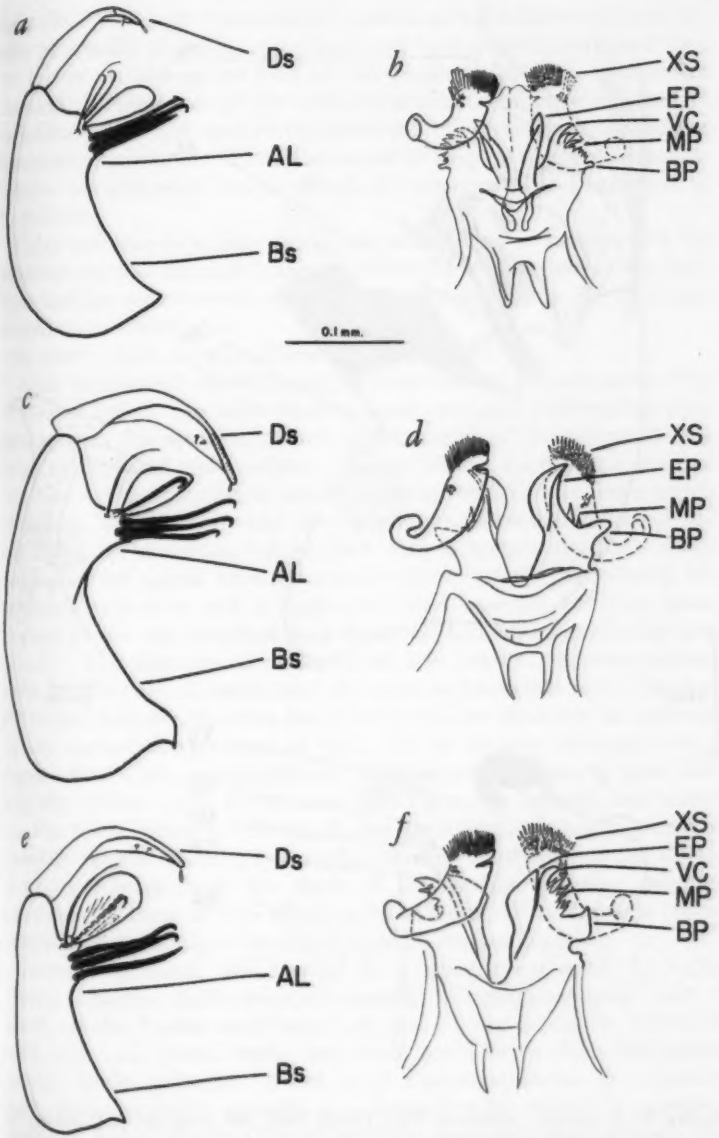

FIGURE 3.—*C. abnormalis*, Villavicencio, Colombia, USNM RB62 718 (paratype of *C. scutatus*): *a*, basistyle and dististyle; *b*, mesosome. *C. acharistus*, Puerto Montt, Chile, USNM RB61 312: *c*, basistyle and dististyle; *d*, mesosome. C. *alani*, Catera a Crachancipa Colombia, USNM RB61 303: *e*, basistyle and dististyle; *f*, mesosome.

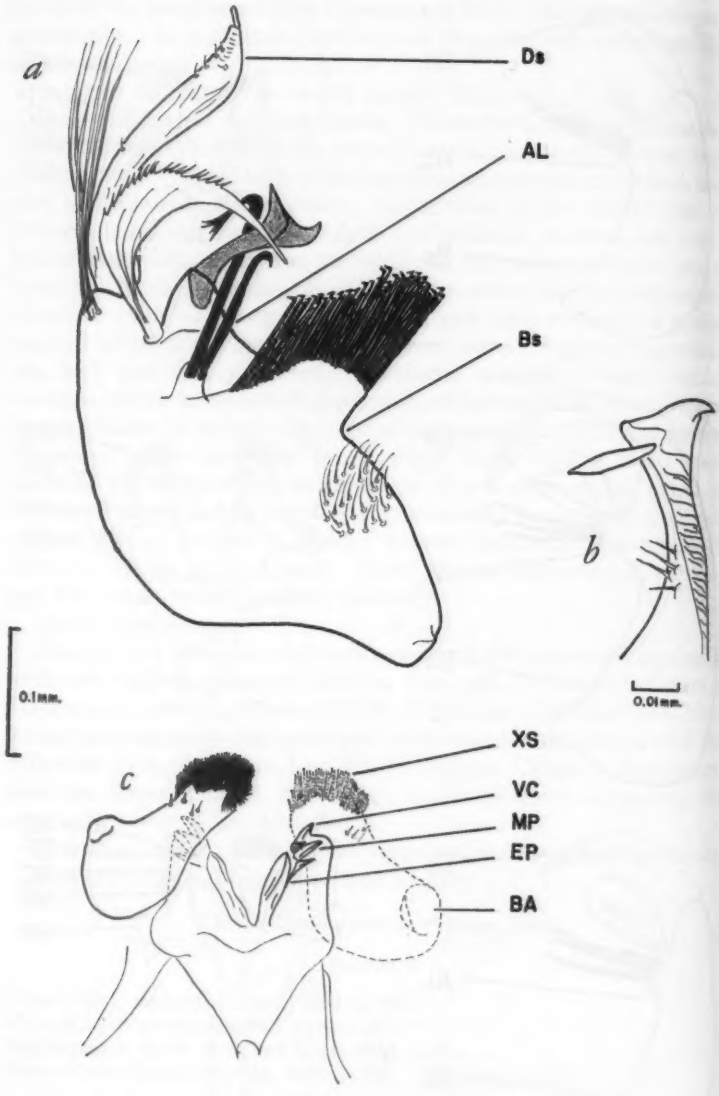

FIGURE 4.—*C. apicinus*, Metucana, Peru, USNM RB62 808 (paratype of *C. debilis*): *a*, basistyle and dististyle; *b*, apex of right dististyle; *c*, mesosome.

basistyle. Mattingly (personal communication, 1962) remounted the male terminalia of the lectotype and sent figures which indicated that the leaves on the apical lobe of the basistyle of both species are identical. Differences in the retrorse process may be attributed to variation within the species (as indicated by variation among other specimens examined). The mesosomes of both species are identical. It is for these reasons that *C. alticola* is here considered a synonym of *C. apicinus*.

Culex apicinus is readily distinguished from other members of the subgenus by the distinctive appendicles of the apical lobe of the basistyle and the robust mesosome. The species appears to be somewhat related to *C. articularis*.

SALIENT CHARACTERS.—Female: See table 1.

Male terminalia: Basistyle rather short and stout; not quite twice as long as broad. In addition to normal long setal pattern, basistyle clothed with fine setae; a distinct circular patch of more than 25 long setae on the basal inner surface. Apical lobe of the basistyle divided into two sections; the basal section is characterized by a dense patch of strong, hooked setae, and two very stout, hooked rods (the distal rod being more robust, longer, and with a furcate tip); the distal section of the apical lobe possesses a thick, heavily sclerotized, biterminal projection and a large gradually tapering leaf (the basal portion of the leaf is serrate and the apical half tapers gradually to a point). The dististyle is rather stout and tubular; minute annulations ring the apical fourth and the apex is developed into a hooked structure; four to six setae are present on the dististyle in contrast to the normal complement of two. Tenth sternite crowned with a dense tuft of short, pointed spines; the basal arm very short, thick, and slightly curved: three to six cercal setae present, broadly distributed on the tenth sternite. External process robust, gradually tapering apically but not reaching the ventral cornu. Ventral cornu dentiform, indistinguishable from the teeth of the median process. Median process with three or four stout, pointed teeth. Basal process represented only by a slight basal bulge of the median process.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 long, multiple. Mentum with about 13 robust teeth; the apical tooth larger than the lateral teeth. Body glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 3.0; six multiple siphonal tufts present, the apical tuft short and only double. Pecten with about eight teeth

restricted to the basal third of the siphon; distal teeth larger than proximal teeth; each tooth with about five coarse barbs on one side. Anal segment spiculate, completely ringed by the saddle.

MATERIAL EXAMINED.—Five male specimens from Bolivia, Chile, and Peru.

DISTRIBUTION.—Reported from the mountains of Peru, Chile, and Bolivia.

Culex (Culex) archegus Dyar, 1929

FIGURES 5*b*, *c*

Culex (Culex) archegus Dyar, 1929, p. 511.

SYSTEMATICS.—Lane (1951) synonymized *Culex archegus* with *C. articularis*. Although, according to Stone et al. (1959) the type of *C. articularis* is nonexistent, Lane's decision was not entirely arbitrary (Lane's 1953 concept of *C. articularis* and *C. archegus* were synonymous). Dyar (1928), however, considered *C. articularis* as a distinct species from *C. articularis* sensu Lane (=*C. archegus*). Lane (1953) did not even consider *C. articularis* sensu Dyar (1928). Since a neotype will be designated for *C. articularis* Philippi sensu Dyar, *C. archegus* Dyar is here revalidated.

Culex archegus is a member of the *salinarius* complex due to the morphology of the male terminalia, but differs from *C. salinarius*, *C. dolosus*, *C. spinosus*, and *C. alani*, by possessing a clavate ventral cornu. Other characters of the mesosome are also distinctive.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly more than twice as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, pointed, and curved at the apical tip; median rod somewhat more robust, prominently curved apically, and slightly longer than basal rod; apical rod more slender than median rod, prominently curved apically, and slightly longer than median rod; leaf obovate, moderate in size; accessory setae two, one short and hooked, the other long and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm long and moderately curved; three or four cercal setae present. External process gradually tapering to a pointed tip, exceeding the ventral cornu in length. Ventral cornu dentiform, slightly separated from the teeth of the median process. Median process possessing about six subequal, sharply pointed teeth. Basal process rather stout, acutely bent posteriorly, pointed, and reaching to approximately the middle of the teeth of the median process.

Larva: After Levi-Castillo (1953). Antennal tuft located in a constriction near the outer third; spiculate basally. Head hairs 5, 6,

and 7 long, multiple, barbed. Body spiculate. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 4.5; four double siphonal tufts present beyond the pecten. Pecten with 13 to 15 teeth on the basal third of the siphon; each tooth with three to five barbs on one side. Anal segment completely ringed by the saddle.

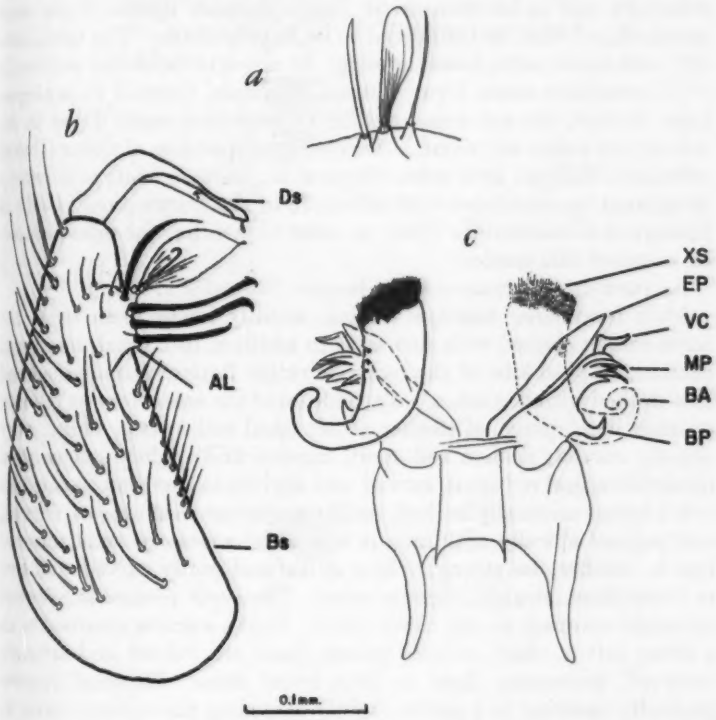

FIGURE 5.—*C. airozai*, Rio Paruari, Brazil (drawn after Lane, 1945): *a*, apical lobe of basistyle. *C. archegus*, Tarma, Peru, USNM RB62 303 (paratype): *b*, basistyle and dististyle; *c*, mesosome.

MATERIAL EXAMINED.—The holotype male and a paratype male from Tarma, Peru; six males from Tinga Maria, Peru, and two males from Bogotá, Colombia.

DISTRIBUTION.—Reported from the type locality, Tarma, Peru, and Quito, Ecuador. Specimens in this study have been examined from Tinga Maria, Peru, and Bogotá, Colombia.

Culex (Culex) articularis Philippi, 1865

FIGURE 6

Culex (Culex) articularis Philippi, 1865, p. 596.

SYSTEMATICS.—Philippi (1865) described *Culex articularis* from Chile. Subsequently Dyar (1928) figured the distinctive male terminalia of this species. Lane (1951) synonymized *C. archgeus* with *C. articularis* and in his monograph (1953) included figures of the male terminalia of what he considered to be *C. articularis*. The terminalia of *C. articularis* sensu Lane, however, do not agree with the terminalia of *C. articularis* sensu Dyar, but are obviously those of *C. archegus*. Lane, in fact, did not even consider *C. articularis* sensu Dyar in his monograph under any name. Since no type specimen of *Culex (Culex) articularis* Philippi, 1865 exists (Stone et al., 1959), a neotype is hereby designated in accordance with article 75 of the International Code of Zoological Nomenclature (1961) in order to stabilize the nomenclatorial status of this species.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle rather flattened, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: a dense basal patch of slender setae; basal rod strong, blunt, very slightly curved; median rod stout, curved, and slightly longer than basal rod; apical rod stout, curved, and slightly longer than the median rod; a broad, unusually hooked, rodlike projection; leaf narrow, curved, and pointed apically with minute striations; accessory setae three or four in number, one strong, as long as leaf and gently curved, and two or three short, straight, slender setae. Dististyle normal in size but minutely annulate at the distal third. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm robust and strongly recurved; possessing three to four cercal setae. External process gradually tapering to a point, slightly exceeding the ventral cornu in length. Ventral cornu dentiform, slightly larger than, and close to the teeth of the median process. Median process with about five distinct teeth. Basal process stout, pointed, and sharply bent so as to be directed posteriorly; some specimens have been observed, however, in which the basal process is straight and pointed.

Larva: Unknown.

NEOTYPE.—A male and associated slide mounted terminalia deposited in the U.S. National Museum with the following data: Casa Pangue, Llanquihue, Chile; December 1926; R. and E. Shannon; USNM RB62 554.

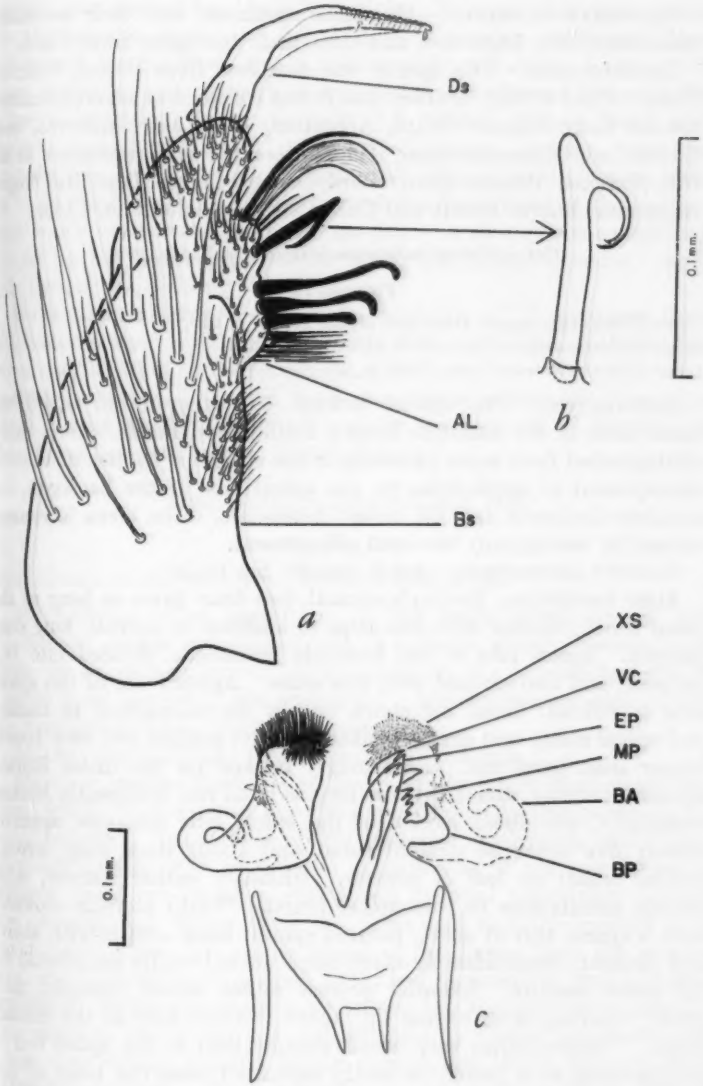

FIGURE 6.—*C. articularis: a*, basistyle and dististyle, Casa Pangue, Chile, USNM RB62 554; *b*, seta on apical lobe of basistyle (enlarged), Rio Negro, Argentina, USNM 2321; *c*, mesosome, Bariloche, Rio Negro, Argentina, USNM RB61 66.

MATERIAL EXAMINED.—Five male specimens and their associated terminalia from Argentina, and three male specimens from Chile.

DISTRIBUTION.—This species was described from Corral, Valdivia, Chile. Dyar (1929) reported that it was collected at several localities around Lake Nahuel Huapi, Argentina, and Lake Guiterrez, both Chilean and Argentine sides. The author has seen specimens in the U.S. National Museum from: Bariloche and Corren Tose, Rio Negro, Argentina; Puerto Montt and Casa Pangue, Llanquihue, Chile.

Culex (Culex) bahamensis Dyar and Knab, 1906

FIGURES 7*a–c*

Culex (Culex) bahamensis Dyar and Knab, 1906b, p. 210.
Culex (Culex) eleuthera Dyar, 1917 (1918), p. 184.
Culex (Culex) petersoni Dyar, 1920, p. 27.

SYSTEMATICS.—This species belongs to the group in which the apical lobe of the basistyle lacks a leaflike appendicle. It is easily distinguished from other members of the subgenus by the distinctive arrangement of appendicles on the apical lobe of the basistyle, the annulate dististyle and the robust mesosome. The larva is characterized by having only two anal gills present.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, less than twice as long as the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, divided into two sections, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod short, narrow (in comparison to median and apical rods), and gently hooked distally; median rod very broad, longer than basal rod, and strongly hooked on the distal fourth; apical rod strong, about twice as long as basal rod, and gently hooked terminally; the distal section of the apical lobe possesses approximately five subequal straight setae, and about three long, strong, rodlike setae; no leaf is present. Dististyle rather narrow, with minute annulations on the apical fourth. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm robust, short, and straight; approximately seven cercal setae broadly distributed on the tenth sternite. External process rather broad, straight, and gently tapering to an obtuse tip; about twice as long as the ventral cornu. Ventral cornu very broad, sharply bent at the apical fourth and tapering to a point; distinctly separated from the teeth of the median process. Median process with about 15 to 20 small conglomerate teeth. Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, multiple,

barbed; preantennal head hair 7 multiple. Mentum with about seven bluntly rounded teeth; the apical tooth is broader and longer than the lateral teeth. Body finely and sparsely spiculate. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 3.5 to 4.5; siphon finely and densely spiculate basally, progressively more coarsely spiculate apically; six or seven multiple siphonal tufts present. Pecten with 10 to 14 teeth reaching a little beyond the basal third of the siphon; each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle; the saddle darkly pigmented dorsally. Anal gills two, short, bulbous.

MATERIAL EXAMINED.—The male terminalia of 17 specimens from the Bahama and Virgin Islands, Puerto Rico, and Cuba; the lectotype larva and 10 other larval specimens.

DISTRIBUTION.—Reported from the Bahama Islands (the type locality), the Antilles, Trinidad, and the southern tip of Florida. A questionable record is from French Guiana.

Culex (Culex) bickleyi Forattini, 1965

FIGURES 7*d*, *e*

Culex (*Culex*) *bickleyi* Bram [sic].—Forattini, 1965, p. 146.

SYSTEMATICS.—The structures of the male terminalia of this species are rather generalized, but it may be readily distinguished from the other members of the subgenus by the pointed and gently curved basal process of the mesosome. Some specimens also exhibit an auxillary point on the basal process.

SALIENT CHARACTERS.—Adult female: Unknown.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod straight, strong and rounded terminally; median rod broader and longer than the basal rod, and terminating in a small hook; apical rod not as broad as, but longer than the median rod, also terminating in a small hook; leaf moderate in size, obovate, exhibiting distinct longitudinal striations; two accessory setae present, one about as long as the leaf and prominently hooked terminally, the other very strong, pointed, gently curved, and longer than the leaf. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, prominently curved at the apex; three or four cercal setae present. External process gradually tapering to a blunt point; exceeding the ventral cornu in length. Ventral cornu dentiform, very similar in size and

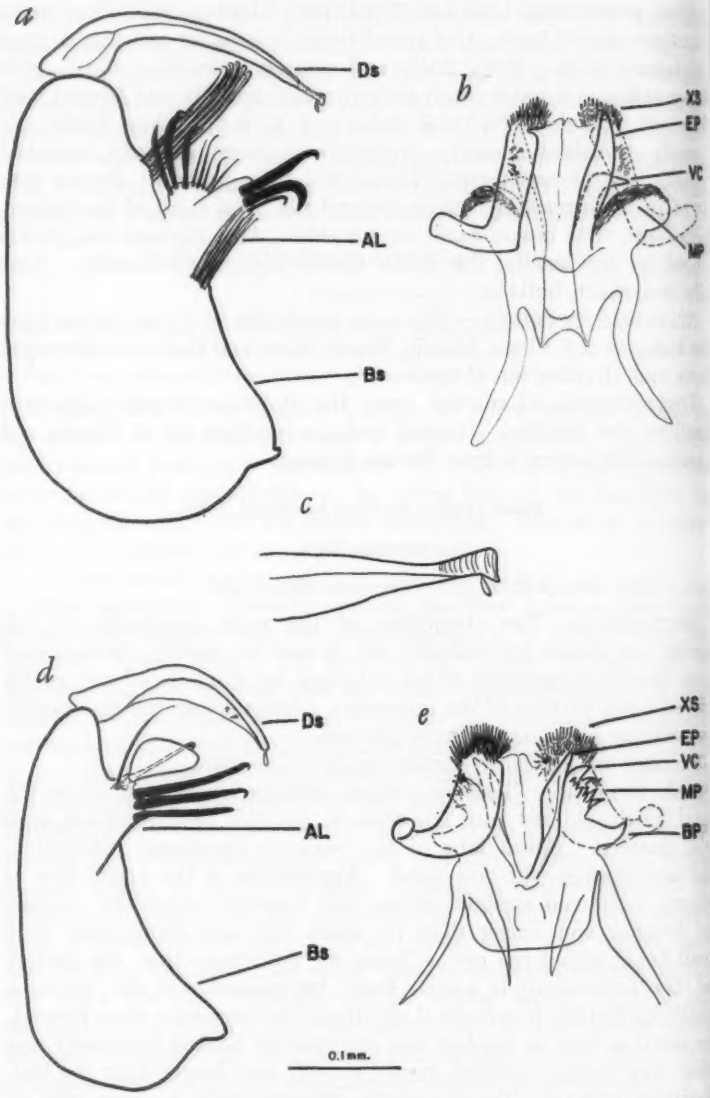

FIGURE 7.—*C. bahamensis: a*, basistyle and dististyle, Guanica Lake, P.R., USNM RB62 68; *b*, mesosome, Salmas, P.R., USNM RB62 30; *c*, apex of dististyle (enlarged), Guanica Lake, P.R., USNM RB62 68. *C. bickleyi*, Bogotá, Colombia, USNM RB62 143 (holotype): *d*, basistyle and dististyle; *e*, mesosome.

shape to the teeth of the median process. Median process with about nine sharply pointed, distinct teeth. Basal process sharply pointed distally, gently curved so as to be directed posterolaterally; occasionally with an auxillary point directed posteriorly.

Larva: Unknown.

HOLOTYPE.—An adult male and associated slide mounted terminalia with the following data: Bosque calderon; Bogotá, Colombia; No. Lab. 4161; RB62 143; USNM 67548. Paratypes, six adult males and associated slide mounted terminalia from Bogotá, Colombia with the following data: No. Lab. 4161, RB62 604; No. Lab. 4158, RB62 137; No. Lab. 4159, RB62 115; No. Lab. 4159, RB62 140; No. Lab. 4168, RB62 146; and No. Lab. 4168, RB62 147. I take pleasure in naming this species in honor of Dr. William E. Bickley.

MATERIAL EXAMINED.—The holotype and six paratype males and associated terminalia from Colombia, four specimens from Ecuador, and two specimens from Jamaica.

DISTRIBUTION.—As reported above; Colombia, Ecuador, and Jamaica.

Culex (Culex) bidens Dyar, 1922

FIGURES 8*a*, *b*

Culex (*Culex*) *bidens* Dyar, 1922b, p. 190.
Culex (*Culex*) *interfor* Dyar, 1928, p. 372. [New synonymy.]
Culex (*Culex*) *virgultus* (=*C. declarator*) sensu Bachmann and Casal (1962), p. 77. [Misidentification.]

SYSTEMATICS.—Lane (1953) synonymized *Culex bidens* with *C. virgultus* (=*C. declarator;* see Stone, 1956 (1957)). During this study the lectotype male terminalia of both *C. bidens* and *C. declarator* were critically examined, compared, and found to be distinct and valid species. Therefore, *C. bidens* is here revalidated. The lectotype male terminalia of *C. interfor* was also examined and found to be conspecific with *C. bidens*. Thus, *C. interfor* is here synonymized with *C. bidens*.

Culex bidens is very similar to *C. declarator*, the species from which it is here revalidated; however, the teeth on the median process of the mesosome are distinctive and diagnostic. In *C. bidens* the individual teeth are long, straight, laterally directed, and sharply pointed. In *C. declarator* these teeth are robust, curved, have somewhat convex margins, and are rather bluntly rounded. In both species the number of teeth may range from one to six.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and

clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, pointed and slightly curved; median and apical rods slightly longer than the basal rod, gently hooked at the distal end; leaf normal, obovate, with minute, longitudinal striations visible; one accessory seta gently curved and about as long as the leaf, the other accessory seta is prominently hooked and flattened apically. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm somewhat flattened and bent at an acute angle; two or three cercal setae present. External process lightly sclerotized (difficult to see without phase contrast), short, straight, and obtuse. Ventral cornu dentiform, equal in size and shape to the teeth of the median process. Median process with one to three strong, straight teeth, which are somewhat extended laterally. Basal process short, pointed, and directed anteriorly.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, triple; preantennal head hair 7 multiple. Mentum with about 17 teeth; the apical tooth very broad and longer than lateral teeth; the two basal lateral teeth longer than other lateral teeth. Thorax spiculate. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 3.5; with three pairs of double or triple siphonal tufts present beyond the pecten. Pecten with about 12 teeth on the basal third of the siphon; each tooth with four to six coarse barbs on one side. Anal segment spiculate, completely ringed by the saddle.

MATERIAL EXAMINED.—The male terminalia of 53 specimens from Argentina, Brazil, Mexico, and Venezuela, as well as the lectotype male from Bolivia; twelve larval specimens from Brazil.

DISTRIBUTION.—It appears that *Culex bidens* has a more southern distribution than its close relative, *C. declarator*. It ranges from central Argentina northward to Venezuela and into southern Mexico. Little reliance can be placed on previous records due to the confusion between this species and the names *declarator*, *interfor*, and *virgultus*.

Culex (*Culex*) *bonneae* Dyar and Knab, 1919

FIGURES 8*c*, *d*

Culex (*Culex*) *bonneae* Dyar and Knab, 1919, p. 3.

SYSTEMATICS.—In the male terminalia this species is very similar to *Culex saltanensis* but can be distinguished by the lack of pilosity on the tenth sternite. The appendicles of the apical lobe of the basistyle also differ between these two species.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, less than twice as long as the basal width; clothed with spiculate setae in addition to normal, long setal pattern. Apical lobe of the basistyle somewhat flattened, undivided, and also clothed with spiculate setae. Appendicles of the

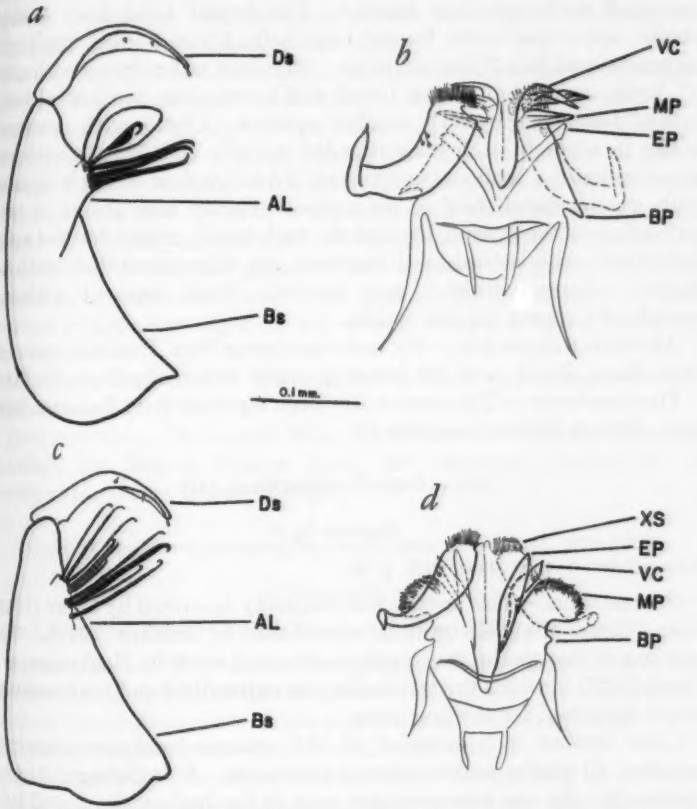

FIGURE 8.—*C. bidens*, Bahia, Brazil: *a*, basistyle and dististyle, USNM RB61 157; *b*, mesosome, USNM RB61 103. *C. bonneae*, Rio Duque, Panama: *c*, basistyle and dististyle, USNM RB62 215; *d*, mesosome, USNM RB61 3.

apical lobe as follows: approximately 10 or more subequal spines and setae distributed on the lobe; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm short and slightly curved distally; two cercal setae present. External process, strong, straight, and gradually tapering to a blunt point;

exceeding the ventral cornu in length. Ventral cornu dentiform, very strong, and sharply pointed; distinctly separated from the teeth of the median process. Median process with 20 or more small, sharply pointed, conglomerate teeth. Basal process represented by a short, bluntly rounded projection of the mesosome.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, triple; preantennal head hair 7 long, multiple. Mentum rather broad with about 17 teeth; apical tooth very broad and larger than the lateral teeth; lateral teeth progressively smaller apically. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 2.5 to 3.0; four multiple siphonal tufts on the distal third of the siphon. Pecten with about 16 teeth extending to the apex of the siphon; each tooth, except for the apical four teeth, with several small barbs on one side; apical four teeth not barbed, strong, straight, and pointed. Anal segment glabrous, completely ringed by the saddle.

MATERIAL EXAMINED.—Six male specimens from Panama, one male from Para, Brazil, and the lectotype male terminalia from Surinam.

DISTRIBUTION.—This species has been reported from Panama, Surinam, French Guiana, and Brazil.

Culex (Culex) brethesi Dyar, 1919

FIGURES 9*a*, *b*

Culex (Culex) brethesi Dyar, 1919, p. 86.

SYSTEMATICS.—This species was originally described by Dyar (1919) from a figure of a male terminalia published by Brèthes (1916). The position of this species was questionable until work by Bachmann and Casal (1962) in which the terminalia was redescribed and the immature stages described for the first time.

Culex brethesi is a member of the *restuans-laticlasper-acharistus* complex, all species with a reduced mesosome. It is distinguished by possessing only one accessory seta next to the leaf on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, less than twice as long as the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, very slightly hooked at apex; median rod broader and slightly longer than basal rod, prominently hooked at apex; apical rod about as broad as basal rod and with a prominent apical curve; leaf

normal in size, tapered to a bluntly rounded apical point, and possessing minute, longitudinal striations; one long, gently curved accessory seta next to the leaf. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderately long, curved, and somewhat flattened distally; three cercal setae present. External process not present. Ventral cornu large, gently curved, and tapering to a point. Median process with two or less small, lightly sclerotized denticles. Basal process absent.

Larva: The larva and pupa of this species were described for the first time by Bachmann and Casal (1962). Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 short, multiple. Mentum with about 12 subequal teeth. Comb with many scales in two or three rows; each scale rounded apically and fringed with subequal spinules. Siphonal index about 6.0; with six pairs of double or triple siphonal tufts beyond the pecten. Pecten with 12 to 13 teeth, restricted to the basal fourth of the siphon. Anal segment completely ringed by the saddle, which is covered with very fine spicules.

MATERIAL EXAMINED.—The male terminalia of three specimens from Argentina.

DISTRIBUTION.—Reported from the states of Cordoba, Misiones, Santiago del Estero, Buenos Aires, and Mendoza, Argentina. A questionable record is from Brazil.

Culex (Culex) brevispinosus Bonne-Wepster and Bonne, 1919 [1920]

FIGURES 9c, *d*

Culex (Culex) brevispinosus Bonne-Wepster and Bonne, 1919 [1920], p. 171.

SYSTEMATICS.—This species is closest to *Culex surinamensis*, but can be distinguished by the clavate ventral cornu. The distinctive teeth of the median plate of the mesosome are also diagnostic.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, three times as long as the basal width; extremely minute spicules present (seen only with phase contrast) in addition to normal, long setal pattern. Apical lobe of the basistyle rather flattened and undivided. Appendicles of the apical lobe as follows: three straight, thin rods which are subequal in length followed by approximately 10 straight, narrow setae; no leaf is present. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm long and prominently recurved; two cercal setae present. External process moderate, gently incurved, and tapering to a point; not reaching the ventral cornu. Ventral cornu dentiform, close to the teeth of the median process. Median

process with approximately eight pointed and distinctly separated teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, triple and barbed; preantennal head hair 7 long, multiple, barbed. Mentum with about 12 teeth; the apical tooth very broad and larger than the lateral teeth; the subbasal lateral tooth longer than other lateral teeth. Body finely spiculate. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 10.0; with three double or single siphonal tufts on the apical half of the siphon. Pecten with about 16 teeth on the basal fourth of the siphon; the apical tooth separated from the other teeth; each tooth with about five coarse barbs on one side. Anal segment completely ringed by the saddle, finely spiculate.

MATERIAL EXAMINED.—Two male specimens and their associated terminalia from Surinam, one of which was a paratype.

DISTRIBUTION.—Reported from Surinam (the type locality), Colombia, Venezuela, and Brazil.

Culex (Culex) carcinoxenus Castro, 1932

FIGURES 10*a*, *b*

Culex (*Culex*) *carcinoxenus* Castro, 1932, p. 99.

SYSTEMATICS.—In *Culex carcinoxenus* the apical lobe of the basistyle possesses only one accessory seta next to the leaf. This species can be distinguished from *C. corniger* by the normal shape of the external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical. Apical lobe somewhat flattened. Appendicles of the apical lobe as follows: three subequal, hooked rods; leaf moderate in size, pointed apically; one rather broad accessory seta next to the leaf. Dististyle normal, but with a slight median bulge. Tenth sternite crowned with a dense tuft of short, pointed spines; the basal arm recurved and moderate in length. External process gradually tapering to a point and reaching approximately to the ventral cornu. Ventral cornu dentiform, somewhat larger than the teeth of the median process. Median process with about five distinct teeth. Basal process robust, straight, and pointed.

Larva: Antennal tuft located in a constriction near the outer third. Postcylpeal head hair 4 single; upper frontal head hair 5 triple; lower frontal head hair 6 double; preantennal head hair 7 multiple. Comb with over 25 scales in a triangular patch; individual scales not fringed. Siphonal index 5.0 to 5.5; four pairs of siphonal tufts inserted on the

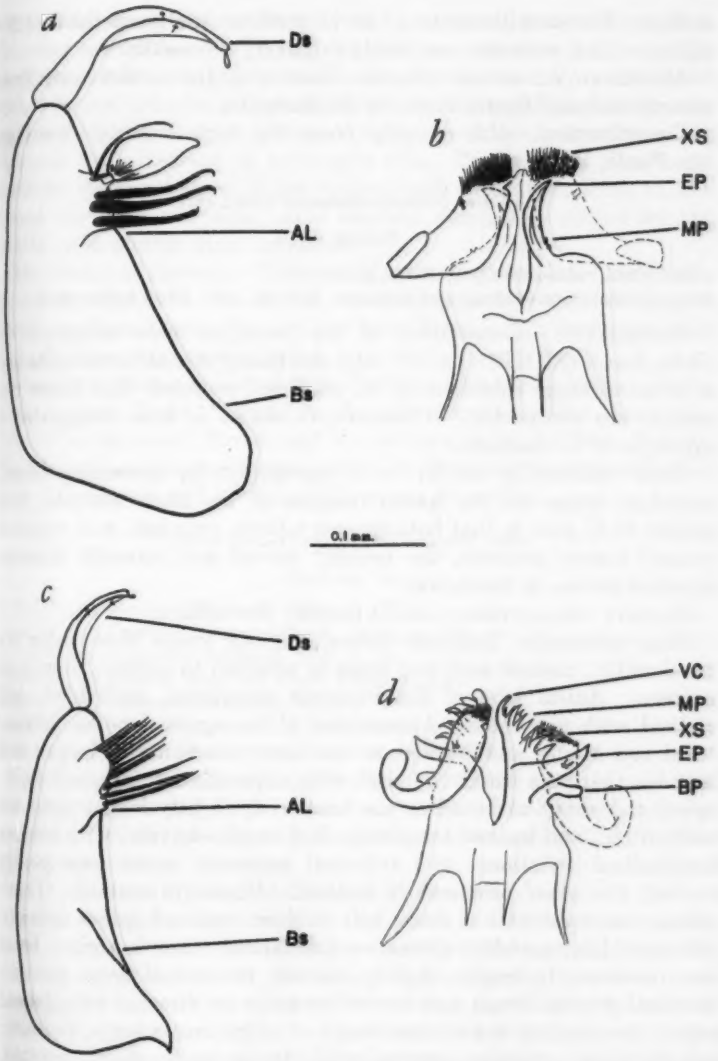

FIGURE 9.—*C. brethesi: a*, basistyle and dististyle, Santiago del Estero, Argentina, USNM Ad. 1683; *b*, mesosome, Buenos Aires, Argentina, USNM 1918. *C. brevispinosus*, Surinam, USNM RB62 231 (paratype): *c*, basistyle and dististyle; *d*, mesosome.

siphon. Pecten with about 11 to 15 teeth on the basal third of the siphon. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—None. Known to the author only from descriptions and figures found in the literature.

DISTRIBUTION.—Known only from the type locality, Bertioga, São Paulo, Brazil.

Culex (Culex) chidesteri Dyar, 1921

FIGURE 10*c*, *d*

Culex (*Culex*) *chidesteri* Dyar, 1921b, p. 117.
Culex (*Culex*) *deanei* Correa and Ramalho, 1959, p. 141. [New synonymy].

SYSTEMATICS.—Comparison of the paratype male terminalia of *Culex deanei* (SEMPDC 6.777) with the holotype male terminalia and a series of other specimens of *C. chidesteri* revealed that these two species are conspecific. Therefore, *C. deanei* is here designated a synonym of *C. chidesteri*.

Culex chidesteri is similar to *C. nigripalpus* by possessing broad, spatulate spines on the lateral margins of the tenth sternite; it is similar to *C. peus* in that both possess a large, rounded, and rugulose ventral cornu; however, the broadly curved and laterally directed external process is distinctive.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong and hooked at the apex; median rod longer and broader than the basal rod and with a prominent terminal hook; apical rod about as broad as the basal rod, slightly longer than the median rod, and hooked terminally; leaf small, obovate, with minute longitudinal striations; two subequal accessory setae, one gently curved, the other prominently hooked. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and spatulate, scalelike spines on the lateral outer margins; basal arm moderate in length, slightly curved; two cercal setae present. External process broad and curved so as to be directed to a lateral point; not reaching the ventral cornu. Ventral cornu large, rounded, and rugulose. Median process with 15 or more short, pointed, conglomerate teeth. Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper frontal head hair 5 with six to eight branches; lower frontal head hair 6 long, triple; preantennal head hair 7 multiple. Mentum broad, with about 13 teeth; the apical tooth is generally

larger than the lateral teeth; the sub-basal lateral teeth longer than the other lateral teeth. Thorax and abdomen spiculate. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index more than 8.0; siphon slender and only slightly tapered; seven to nine pairs of two to four branched siphonal tufts inserted in a straight line. Pecten with nine to 12 teeth on the basal third of the siphon; each tooth with three to five coarse barbs on one side. Anal segment completely ringed by the saddle; gills shorter than the saddle.

MATERIAL EXAMINED.—Three adult males and associated terminalia from Argentina, two from Brazil, two from Ecuador, two from Puerto Rico, one from Venezuela, and one from Texas. The lectotype male from Panama was also studied.

DISTRIBUTION.—Reported from Panama (the type locality), Costa Rica, Mexico, Texas, Puerto Rico, Jamaica, Lesser Antilles, Venezuela, Colombia, Ecuador, Brazil, and a questionable record from Bolivia. The author has seen specimens in the U.S. National Museum collection from Concepción and Medinas, Tucuman, Argentina.

Culex (*Culex*) *corniger* Theobald, 1903

FIGURES 10*e*, *f*

Culex (*Culex*) *corniger* Theobald, 1903a, p. 173.
Culex (*Culex*) *basilicus* Dyar and Knab, 1906a, p. 169.
Culex (*Culex*) *hassardii* Grabham, 1906, p. 167.
Culex (*Culex*) *lactator* Dyar and Knab, 1906b, p. 209.
Culex (*Culex*) *subfuscus* Theobald, 1907, p. 403.
Culex (*Culex*) *loquaculus* Dyar and Knab, 1909a, p. 254.
Culex (*Culex*) *rigidus* Senevet and Abonnenc, 1939, p. 68.

SYSTEMATICS.—*Culex corniger* is distinctive from other members of the subgenus having only one accessory seta next to the leaf on the apical lobe of the basistyle by possessing a short, pointed, distinctive external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Adult male: Basistyle tubular, two and a half times as long as the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod narrow, straight, and pointed; median rod robust, longer than basal rod, and prominently hooked at the apex; apical rod similar in size and shape to the basal rod; leaf short and truncate, with some minute, basal, longitudinal striations; accessory seta long and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, strongly curved at the distal end; two cercal setae present. External process narrow, straight, and sharply pointed; not reaching the ventral cornu.

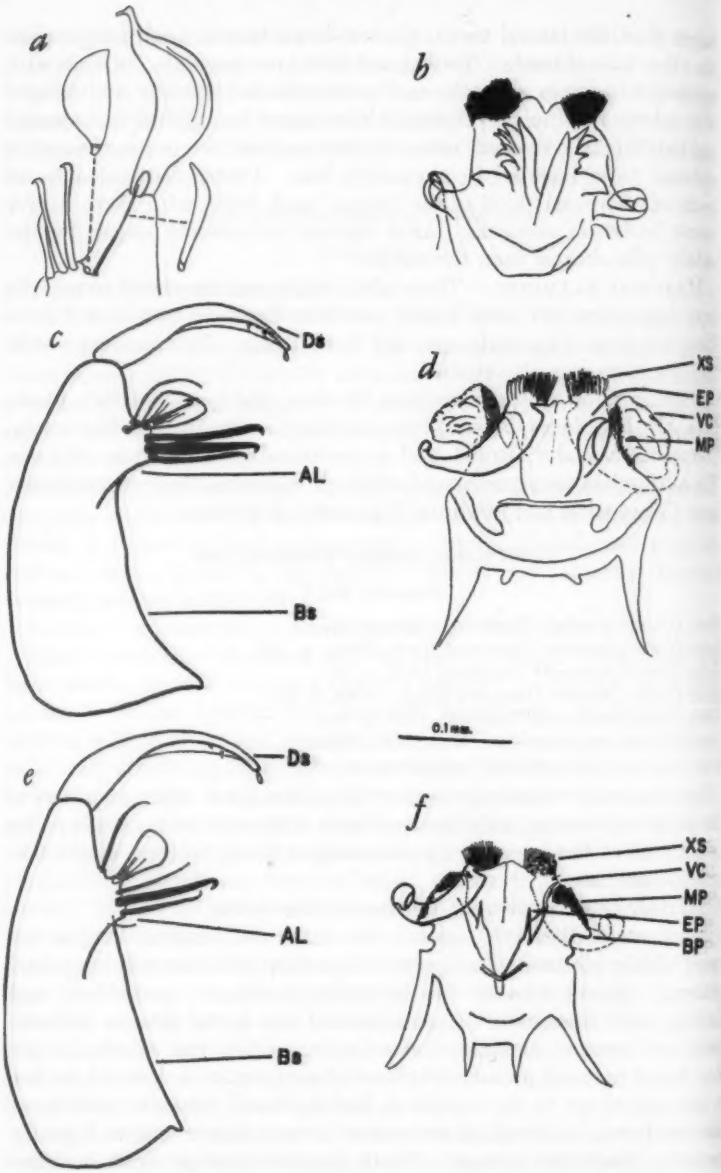

FIGURE 10.—*C. carcinoxenus* (drawn after Castro, 1932): *a*, basistyle and dististyle; *b*, mesosome. *C. chidesteri*: *c*, basistyle and dististyle, Bahia, Brazil, USNM RB61 137; *d*, mesosome, Mayaguez, P.R., USNM RB61 409. *C. corniger*, Para, Brazil: *e*, basistyle and dististyle, USNM RB61 87; *f*, mesosome, USNM RB62 577.

Ventral cornu dentiform, close to the teeth of the median process. Median process with over 15 conglomerate teeth. Basal process represented by only a small, bluntly rounded knob.

Larva: Antenna fusiform, glabrous; antennal tuft short, double, located on about the middle of the antenna. Postclypeal head hair 4 long, double; upper frontal head hair 5 longer than head hair 4, also double; lower frontal head hair 6 long, triple; preantennal head hair 7 long, multiple. Mentum with about 28 very narrow, long teeth; the apical tooth somewhat longer and broader than the lateral teeth. Body glabrous. Comb with about 35 scales in a triangular patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 2.5; five multiple siphonal tufts randomly placed on the siphon. Pecten with about 10 long, pointed teeth on the basal half of the siphon; basal teeth possessing one or two fine barbs on one side. Anal segment completely ringed by the saddle, with several prominent spicules in a patch at the apex.

MATERIAL EXAMINED.—Twenty-one adult males and associated terminalia from Brazil, four from Ecuador, one from Guatemala, two from Jamaica, four from Mexico, one from Nicaragua, 10 from Panama, three from Peru, one from Venezuela, and one from Trinidad.

DISTRIBUTION.—This species has been reported from Brazil (Para, Brazil, being the type locality), Mexico, El Salvador, British Honduras, Nicaragua, Costa Rica, Panama, Cuba, Haiti, Jamaica, Trinidad, Guianas, Venezuela, Colombia, Ecuador, Peru, Bolivia, and Uruguay. One specimen has been seen by the author in the U.S. National Museum collection from Cayuga, Guatemala.

The *Culex coronator* Complex

FIGURE 11

Culex coronator was described by Dyar and Knab (1906b) from the larval stage. Subsequently Dyar (1918b, 1922a, and 1925) described *C. usquatus*, *C. usquatissimus*, *C. ousqua*, and *C. coronator camposi*. The status of these species was reviewed by Dyar (1922a) and Bonne and Bonne-Wepster (1925). The primary differentiating characters were the arrangement of appendicles on the apical lobe of the basistyle and the length of the apical setae on the basistyle. Later Anduze (1943a) described *C. albertoi*, and *C. coronator mooseri* was described by Vargas and Martinez Palacios (1954). Stone et al. (1959) including supplements by Stone (1961 and 1963) listed current synonymy as follows: *C. coronator* maintains species rank and includes the synonyms *C. ousqua*, *C. usquatus*, *C. usquatissimus*, and *C. albertoi*; *C. coronator camposi* and *C. coronator mooseri* retain their original subspecies designation.

During this study the male terminalia of 227 specimens belonging to the *coronator* complex were critically examined and assigned to the various named taxa on the basis of morphological criteria. The areas from which these specimens were collected are delineated in figure 11*a*. Results of these studies are tabulated in table 3, and probable distribution of each species is plotted on figures 11*b–f*.

Consideration of the morphological differences and the geographical distribution of each taxon reveals that the various forms are not randomly distributed throughout the areas, but assume discrete distributional patterns. All forms are sympatric in area IV (Colombia), but in no other collection area have all forms been found. Thus, the morphological and distributional data suggest that speciation has occurred, and it is for this reason that the following species are here designated as valid: *Culex coronator*, *C. ousqua*, *C. usquatus*, *C. camposi*, and *C. usquatissimus*. On the basis of morphological similarity in the male terminalia *C. albertoi* is placed in synonymy with *C. ousqua*, and *C. coronator mooseri* is placed in synonymy with *C. coronator*. *C. covagarciai* is described from a specimen sent to Dr. Stone by Dr. Pablo Cova Garcia from Venezuela.

The evidence gleaned from the 227 specimens in no way challenges the hypothesis that speciation has occurred and, in fact, supports this hypothesis. Revalidation of the species in this complex may well stimulate future research in the *C. coronator* group that will elucidate true relationships and contribute to concepts of speciation applicable to the entire family Culicidae. Detailed descriptions of the immature stages of each form are necessary; biological data for the various species must be obtained; hybridization experiments, such as those conducted in the *pipiens-quinquefasciatus* complex, would be invaluable; and cytogenetic studies would be appropriate.

Culex (*Culex*) *coronator* Dyar and Knab, 1906

FIGURES 12*a*, *f*

Culex (*Culex*) *coronator* Dyar and Knab, 1906b, p. 215.

Culex (*Culex*) *coronator mooseri* Vargas and Martinez Palacios, 1954, p. 33. [New synonymy.]

SYSTEMATICS.—The male terminalia of six specimens collected at the type locality in 1941 by M. Macias Gomez and determined by Dr. L. Vargas as *C. c. mooseri* were sent to the author (apparently these specimens were part of the original type series, although they were not designated as such in the original description). These specimens were compared with a large series of *C. coronator* and found to be conspecific.

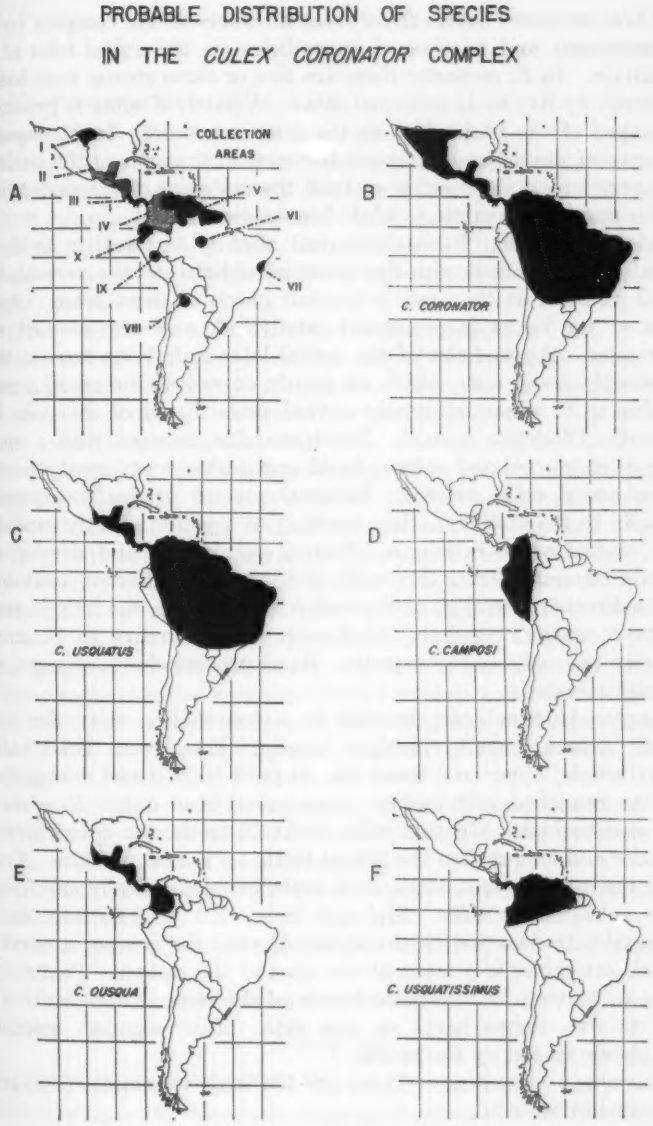

FIGURE 11.—Probable distribution of species in the *Culex coronator* complex: *a*, collection areas; *b*, *C. coronator*; *c*, *C. usquatus*; *d*, *C. camposi*; *e*, *C. ousqua*; *f*, *C. usquatissimus*.

Culex coronator differs from other members of the complex by the arrangement and number of appendicles on the apical lobe of the basistyle. In *C. coronator* there are two or three strong rods basally followed by five to 15 subequal setae. A patch of setae is present at the apex of the basistyle, but the setae are short. In *C. usquatus*, *C. camposi*, and *C. usquatissimus*, the setae at the apex of the basistyle are very long and extend to at least the midpoint of the dististyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern; at the apex is a small patch of short setae. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: two or three subequal, strong rods, which are gently curved at the apex; a group of five to 13 subequal, gently curved setae distad of the rods; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu long and slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crown of the bend, the margin seems to be somewhat rugulose. Median process with five to 11 strong, sharply pointed, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, three or four branched, and barbed; preantennal head hair 7 long, multiple, and barbed. Mentum with about 15 teeth; the apical tooth is broader and longer than the lateral teeth. Thorax spiculate. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 8.0 to 9.0; four double siphonal tufts inserted on the siphon beyond the pecten; a crown of prominent spines is present at the apex of the siphon. Pecten with eight to 14 teeth on the basal fourth of the siphon; each tooth with two to five coarse barbs on one side. Anal segment spiculate, completely ringed by the saddle.

MATERIAL EXAMINED.—There are 104 male terminalia from areas indicated in table 3.

DISTRIBUTION.—Probable distribution of this species is plotted on figure 11*b*.

Culex (Culex) usquatus Dyar, 1918

FIGURE 12*b*

Culex (Culex) usquatus Dyar, 1918b, p. 122.

SYSTEMATICS.—The appendicles on the apical lobe of the basistyle are distinctive. Rods are absent, but a group of 10 to 15 subequal, gently curved setae are evenly distributed on the lobe. A small patch of setae is present at the apex of the basistyle; these setae are very long, reaching to at least the midpoint of the dististyle The mesosome cannot be distinguished from other members of the complex, except *C. covagarciai*.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern; at the apex is a small patch of long setae. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: rods absent; a group of approximately 10 to 15 subequal, gently curved setae evenly distributed on the lobe; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu long and slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crest of the bend the margin seems to be somewhat rugulose. Median process with five to 10 strong, sharply pointed, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Similar to *Culex coronator*. Detailed descriptions of the immature stages are not available, and individual rearings of specimens belonging to this species were not examined.

MATERIAL EXAMINED.—Fifty-one male terminalia from areas indicated in table 3.

DISTRIBUTION.—Probable distribution of this species is plotted on figure 11*c*.

Culex (Culex) camposi Dyar, 1925

FIGURE 12*c*

Culex (Culex) camposi Dyar, 1925, p. 28.

SYSTEMATICS.—In this species a group of approximately 10 subequal, gently curved setae are evenly distributed on the apical lobe of the basistyle. The diagnostic character is a small tubercle distad of the

apical lobe possessing one or two strong, gently hooked spines. A small patch of setae is present at the apex of the basistyle; these setae are very long, reaching to at least the midpoint of the dististyle. The mesosome cannot be distinguished from other members of the complex, except *Culex covagarciai*.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern; at the apex is a small patch of long setae. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: rods absent; a group of approximately 10 subequal, gently curved setae evenly distributed on the lobe; a small tubercle distad of the apical lobe possessing one or two strong, gently hooked spines; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu long and slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crest of the bend, the margin seems to be somewhat granulose. Median process with five to 11 strong, sharply pointed, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Similar to *Culex coronator*. Detailed descriptions of the immature stages are not available, and individual rearings of specimens belonging to this species were not examined.

MATERIAL EXAMINED.—Forty-two male terminalia from areas indicated in table 3.

DISTRIBUTION.—Probable distribution of this species is plotted on figure 11*d*.

Culex (*Culex*) *ousqua* Dyar, 1918

FIGURE 12*d*

Culex (*Culex*) *ousqua* Dyar, 1918a, p. 99.
Culex (*Culex*) *albertoi* Anduze, 1943a, p. 193. [New synonymy.]

SYSTEMATICS.—*Culex albertoi* was described from a single male and although the holotype has not been examined, Anduze's detailed original description readily identifies this species with *C. ousqua*.

Culex ousqua is distinguished from other members of the complex by the appendicles on the apical lobe of the basistyle. The apical lobe is divided into a large proximal lobe and a small distal tubercle; a group of approximately 10 subequal, gently curved setae are evenly distributed on the proximal lobe; four or five subequal, gently curved setae are

present on the distal tubercle. A patch of setae is present at the apex of the basistyle, but the setae are short.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern; at the apex is a small patch of short setae. Apical lobe of the basistyle prominent, divided into a large proximal lobe and a small distal tubercle; also clothed with fine setae. Appendicles of the apical lobe as follows: rods absent; a group of approximately 10 subequal, gently curved setae evenly distributed on the proximal lobe; four or five subequal, gently curved setae on the distal tubercle; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three to five cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu long and slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crest of the bend the margin seems to be somewhat rugulose. Median process with six to 10 strong, sharply pointed, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Similar to *Culex coronator*. Detailed descriptions of the immature stages are not available, and individual rearings of specimens belonging to this species were not examined.

MATERIAL EXAMINED.—Twenty male terminalia from areas indicated in table 3.

DISTRIBUTION.—Probable distribution of this species is plotted on figure 11*e*.

Culex (Culex) usquatissimus Dyar, 1922

FIGURE 12*e*

Culex (Culex) usquatissmus Dyar, 1922a, p. 19.

SYSTEMATICS.—Appendicles on the apical lobe of the basistyle distinguish this species from other members of the complex. The apical lobe is divided into a large, proximal lobe and a small distal tubercle. On the proximal lobe there are three subequal, strong rods, which are gently curved at the apex; on the distal tubercle there are three to five subequal, gently curved setae. A small patch of setae is present at the apex of the basistyle; these setae are very long, reaching to at least the midpoint of the dististyle. The mesosome cannot be distinguished from other members of the complex, except *Culex covagarciai*.

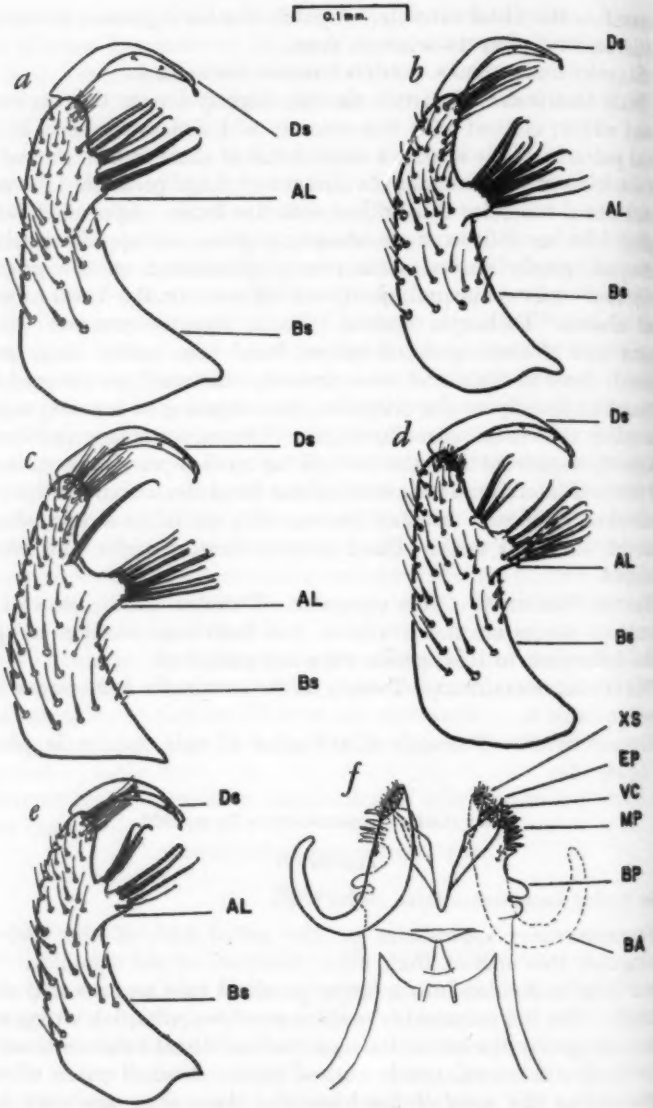

FIGURE 12.—Basistyle and dististyle: *a*, *C. coronator*, San Pedrode, Argentina, USNM RB61 83; *b*, *C. usquatus*, Piraja, Brazil, USNM RB61 275; *c*, *C. camposi*, Fosca, Colombia, USNM RB62 109; *d*, *C. ousqua*, Port Limón, Costa Rica, USNM RB62 80; *e*, *C. usquatissimus*, Panama, C.Z., USNM RB62 491. Mesosome: *f*, *C. coronator*, San Pedrode, Argentina, USNM RB61 83.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern; at the apex is a small patch of long setae. Apical lobe of the basistyle prominent, divided into a large, proximal lobe and a small distal tubercle; also clothed with fine setae. Appendicles of the apical lobe as follows: three subequal, strong rods which are gently curved at the apex on the proximal lobe; an accessory seta may also be present; distal tubercle with three to five subequal, gently curved setae; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu long and slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crest of the bend the margin seems to be somewhat rugulose. Median process with five to 10 strong, sharply pointed, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Similar to *Culex coronator*. Detailed descriptions of the immature stages are not available, and individual rearings of specimens belonging to this species were not examined.

MATERIAL EXAMINED.—Ten male terminalia from areas indicated in table 3.

DISTRIBUTION.—Probable distribution of this species is plotted on figure 11*f*.

Culex (*Culex*) *covagarciai* Forattini, 1965

FIGURE 13

Culex (*Culex*) *covagarciai* Bram [sic].—Forattini, 1965, p. 128.

SYSTEMATICS.—*Culex covagarciai* is distinguished from other members of the complex by appendicles of the apical lobe of the basistyle and the ventral cornu. The apical lobe of the basistyle is extended into a thumblike projection. On this lobe is one short, very broad rod and two long, prominently hooked rods; there are also several subequal hooked setae next to the rods. The setae at the apex of the basistyle are not long. The ventral cornu, although similar in shape to that of other members of the complex, is considerably longer than in the other species. At the crown on the bend of the ventral cornu, the margin appears to be finely spiculate.

SALIENT CHARACTERS.—Adult female: Unknown.

Male terminalia: Basistyle conical, slightly longer than two and a half times the basal width; clothed with fine setae in addition to the normal, long setal pattern; setae at the apex very small and short.

Apical lobe of the basistyle prominent, undivided, and extended into a thumblike projection. Appendicles of the apical lobe as follows: one short, very broad rod and two long prominently hooked rods at the terminal end of the apical lobe; several subequal, hooked setae next to the rods; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm rather long, gently curved; three cercal setae present. External process gradually expanding distally to the midpoint, then tapering to a point; slightly exceeding the ventral cornu in length. Ventral cornu very long and bluntly rounded, slender, distinctly separated from the teeth of the median process, bent so as to be directed laterally; at the crown of the bend, the margin seems somewhat rugulose and even appears to be finely spiculate. Median process with about four strong, subequal teeth. Basal process short, straight, and bluntly rounded.

Larva: Antenna shorter than the head, constricted beyond insertion of antennal tuft, with part before constriction pale and spiculate, part beyond constriction darker and with few spicules; antennal tuft large, multiple, barbed, inserted at outer third of shaft, reaching well beyond the tip. Head hairs: postclypeal 4 short, single; upper and lower frontals 5 and 6 long, triple, barbed; preantennal 7 long, multiple, barbed. Mentum with about 11 teeth; the apical tooth broader and larger than lateral teeth; the subbasal lateral teeth larger than the other lateral teeth. Prothoracic hairs: 1–5 long, single; 6 long, triple; 7 long, double. Thorax and abdomen finely spiculate. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 8.5; pecten with about 15 teeth on the basal third of the siphon; each tooth with several coarse barbs on one side; with four single or double siphonal tufts inserted beyond the pecten; a series of small spines are present at the apex of the siphon (these spines are not nearly as numerous or prominent as in other members of the *coronator* complex). Anal segment with prominent spicules, completely ringed by the saddle; lateral hair short, double.

HOLOTYPE.—The male terminalia with its associated larval and pupal skins from San Antonia de Caparo, Municipal Capital, Venezuela, September 1963; P. Cova Garcia; Number 140 D, USNM 67549; deposited in the U.S. National Museum collection. I take pleasure in naming this species in honor of Dr. Pablo Cova Garcia, who sent this specimen to Dr. Alan Stone. According to Cova Garcia (personal communication, 1964) the breeding place of the type specimen was on the bank of a river in a pool of standing, clear, fresh water with some shadow during the rainy season.

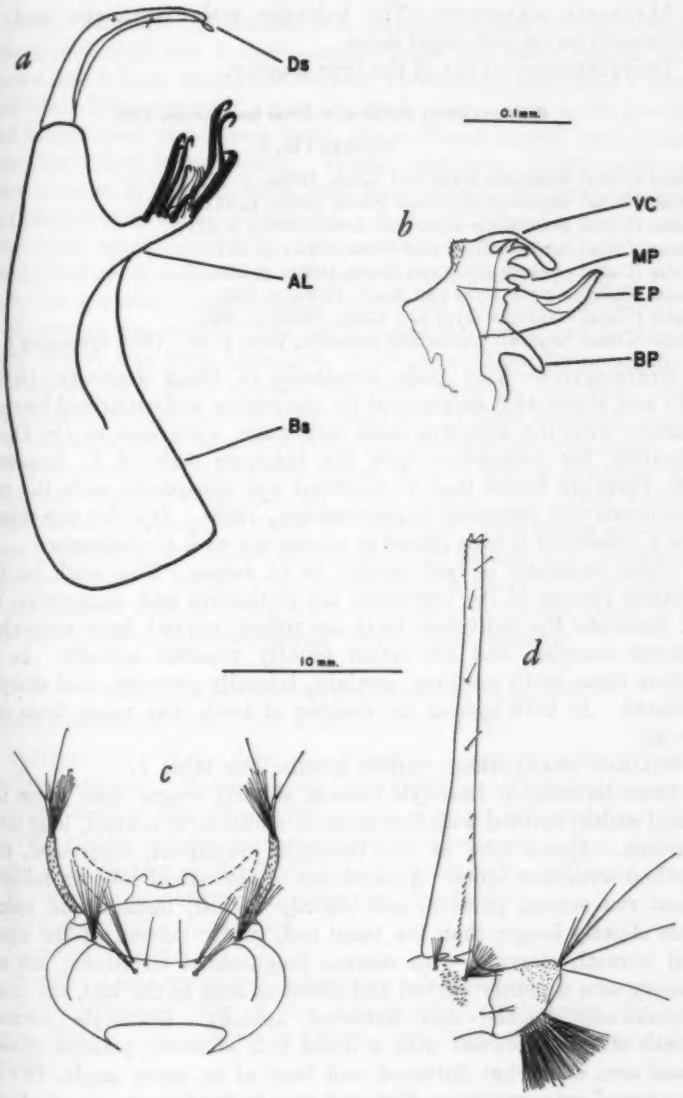

FIGURE 13.—*Culex covagarciai*, Maracay, Venezuela, USNM 140D: *a*, basistyle and dististyle; *b*, mesosome (everted); *c*, larval head; *d*, larval siphon and anal segment.

MATERIAL EXAMINED.—The holotype male terminalia and its associated larval and pupal skins.

DISTRIBUTION.—That of the type locality.

Culex (Culex) declarator Dyar and Knab, 1906

FIGURES 14*a*, *b*

Culex (*Culex*) *declarator* Dyar and Knab, 1906b, p. 211.
Culex (*Culex*) *inquisitor* Dyar and Knab, 1906b, p. 211.
Culex (*Culex*) *proclamator* Dyar and Knab, 1906b, p. 211.
Culex (*Culex*) *jubilator* Dyar and Knab, 1907a, p. 201.
Culex (*Culex*) *revelator* Dyar and Knab, 1907b, p. 202.
Culex (*Culex*) *dictator* Dyar and Knab, 1909a, p. 225.
Culex (*Culex*) *vinidcator* Dyar and Knab, 1909a, p. 255.
Culex (*Culex*) *forattinii* Correa and Ramalho, 1959, p. 55. [New synonymy.]

SYSTEMATICS.—Two male terminalia of *Culex declarator* (RB61 419 and RB62 444) determined by the author and confirmed by comparison with the lectotype male terminalia, were sent to Dr. O. P. Forattini for comparison with the holotype male of *C. forattinii*. Dr. Forattini found that *C. forattinii* was conspecific with the two specimens sent (personal communication, 1963). It is for this reason the *C. forattinii* is here placed in synonymy with *C. declarator*.

Culex declarator is very similar to *C. bidens*. The teeth on the median process of the mesosome are distinctive and diagnostic. In *C. declarator* the individual teeth are robust, curved, have somewhat convex margins, and are rather bluntly rounded apically. In *C. bidens* these teeth are long, straight, laterally directed, and sharply pointed. In both species the number of teeth may range from one to six.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, pointed, and slightly curved; median and apical rods slightly longer than the basal rod, gently hooked at the apex; leaf normal, obovate, with minute longitudinal striations; one accessory seta is gently curved and about as long as the leaf, the other prominently hooked and flattened apically. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm somewhat flattened and bent at an acute angle; two to four cercal setae present. External process lightly sclerotized, short, and straight. Ventral cornu dentiform, equal in size and shape to the teeth of the median process. Median process with one to four strong, curved, robust teeth. Basal process short, pointed, and directed laterally.

Larva: Antennal tuft located in a constriction near the outer third. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, triple, and barbed; preantennal head hair 7 large, multiple. Mentum with about 20 teeth; the apical tooth broader and longer than the lateral teeth, the subbasal lateral teeth longer than the other lateral teeth. Thorax spiculate. Comb with numerous scales in a patch; each scale long, broadly expanded apically and fringed with subequal spinules. Siphonal index 5.0 to 6.0; with three pairs of siphonal tufts. Pecten with numerous teeth on the basal third to two-fifths of the siphon; each tooth with two to six barbs on one side. Anal sigment completely ringed by the saddle.

MATERIAL EXAMINED.—Ten adult males and associated terminalia from Brazil, five from Colombia, three from Costa Rica, one from Guatemala, two from Mexico, five from Panama, one from Peru, one from Surinam, six from Venezuela, and 11 from the West Indies. The lectotype male terminalia from Trinidad was also examined.

DISTRIBUTION.—This species seems to have a more northern distribution than its close relative, *Culex bidens*. The range extends from Texas southward through the countries listed above and to at least the state of São Paulo, Brazil (the type locality of *C. forattinii*). As indicated for *C. bidens*, a re-evaluation of the distributional patterns of this species must be made due to confusion in the literature of the names *declarator*, *virgultus*, *bidens*, *interfor*, and *forattinii*.

Culex (*Culex*) *delys* Howard, Dyar, and Knab, 1915

Culex (*Culex*) *delys* Howard, Dyar, and Knab, 1915, p. 317.

SYSTEMATICS.—*Culex delys* was placed in synonymy with *C. mollis* by Dyar (1921b). Subsequently Lane (1951) revalidated the species. Neither author presented evidence to support his decision. The validity of this species seems questionable; however, a final decision must await further study of other adult forms in the subgenus.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Unknown.

Larva: Unknown.

MATERIAL EXAMINED.—The holotype adult female.

DISTRIBUTION.—That of the type locality, Tabernilla, Panama Canal Zone. This species is known only from the holotype adult female.

Culex (*Culex*) *diplophyllum* Dyar, 1929

FIGURES 14*c*, *d*

Culex (*Culex*) *diplophyllum* Dyar, 1929, p. 509.

SYSTEMATICS.—The most characteristic feature of *Culex diplophyllum* is the presence of two distinct leaves on the apical lobe of

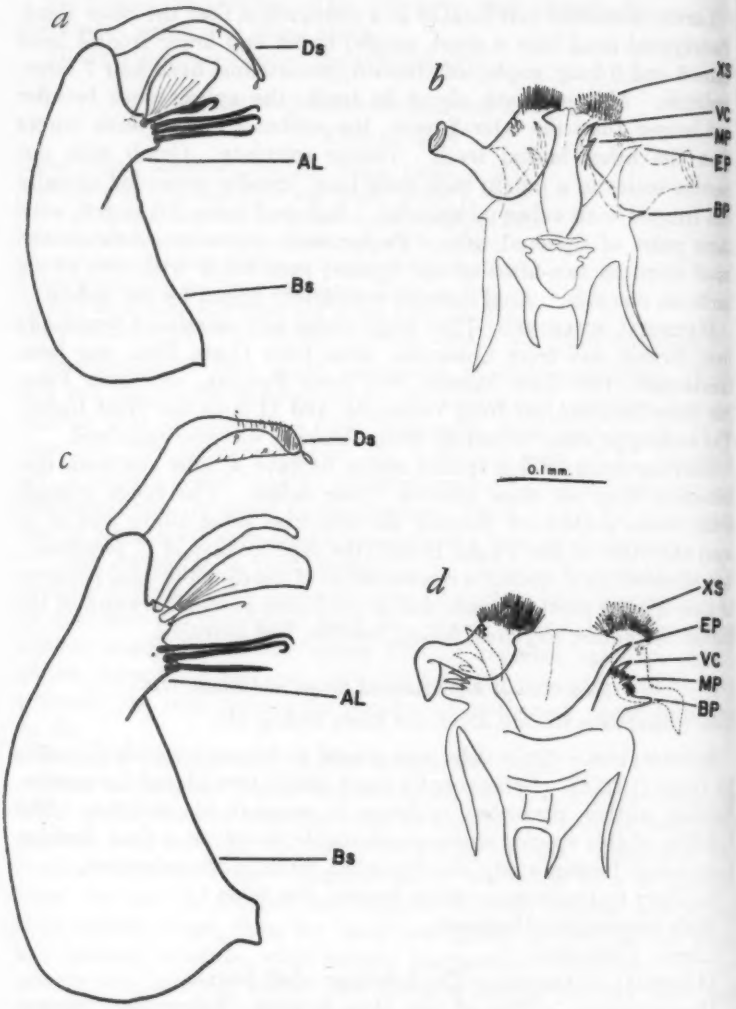

FIGURE 14.—*C. declarator: a*, basistyle and dististyle, Maracay, Venezuela, USNM RB62 444; *b*, mesosome, Panama, C.Z., USNM RB62 498. *C. diplophyllum*, Lima, Peru, USNM RB62 806: *c*, basistyle and dististyle; *d*, mesosome.

the basistyle. Two other species, *C. foliaceus* and *C. lahillei*, also possess two leaves on the apical lobe, but neither exhibits annulations on the apical third of the dististyle as does *C. diplophyllum*.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod straight and pointed; median and apical rods longer than the basal rod and gently hooked; one fine, prominently hooked, accessory seta present; two leaves present, the proximal leaf large, obovate, and possessing distinct basal, longitudinal striations, the distal leaf very narrow but as long as the proximal leaf and also exhibiting longitudinal striations. Dististyle quite broad, possessing annulations on the apical third. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length and sharply bent; three to four cercal setae present. External process gradually tapering to a point, exceeding the ventral cornu in length. Ventral cornu dentiform, close to the teeth of the median process. Median process with five to nine distinctly separated teeth. Basal process longer than the teeth of the median process, straight, and truncate.

Larva: Antennal tuft located in a constriction near the outer third. Frontal head hairs 4, 5, 6, and 7 multiple. Mentum with about 20 teeth; the apical tooth broader and longer than the lateral teeth. Body glabrous. Comb with many free scales in three or four rows. Siphonal index greater than 4.0. Pecten restricted to the basal third of the siphon followed by four multiple tufts and a single seta before the apex. Anal segment completely ringed by the saddle which is spiculose on the posterior margin.

MATERIAL EXAMINED.—The lectotype male and a paratype male and associated terminalia from Lima, Peru, and another male specimen also from Lima, Peru.

DISTRIBUTION.—Reported only from Lima, Peru.

Culex (Culex) dolosus (Lynch Arribálzaga), 1891

FIGURES 15*a*, *b*

Heteronycha dolosus Lynch Arribálzaga, 1891, p. 156.
Culex (Culex) bilineatus Theobald, 1903a, p. 196.
Culex (Culex) bonariensis Bréthes, 1916, p. 213.

SYSTEMATICS.—*Culex dolosus* is a member of the *salinarius* complex. It differs from *C. salinarius* in the conformation of the basal process and the external process; it differs from *C. spinosus* in the length and

shape of the basal process; it differs from *C. archegus* in possessing a ventral cornu which is dentiform and very similar in size and shape to the teeth of the median process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, rounded terminally; median rod broader and longer than the basal rod, and terminating in a gentle hook; apical rod not as broad as the median rod, also terminating in a gentle hook; leaf moderate in size, obovate, exhibiting distinct longitudinal striations; two accessory setae present, one shorter than the leaf and prominently hooked terminally, the other very long, pointed, and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm very long, prominently recurved; three or four cercal setae present. External process gradually tapering to a blunt point; considerably exceeding the ventral cornu in length. Ventral cornu dentiform, very similar in size and shape to the teeth of the median process. Median process with about six to eight sharply pointed, distinct teeth. Basal process sharply pointed distally, acutely bent so as to be directed posteriorly; reaching, at most, to the middle of the median process.

Larva: After Lane (1953). Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, barbed. Body glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 5.0 to 6.0; four triple siphonal tufts inserted on the siphon beyond the pecten. Pecten with about 13 teeth on the basal third of the siphon; each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle, spiculate dorsally.

MATERIAL EXAMINED.—Six male terminalia from Bolivia, Argentina, and Brazil.

DISTRIBUTION.—Reported from Argentina, Chile, Uruguay, Brazil, Bolivia, and Ecuador.

Culex (Culex) duplicator Dyar and Knab, 1909

FIGURES 15*c*, *d*

Culex (Culex) duplicator Dyar and Knab, 1909a, p. 258.

SYSTEMATICS.—This species is similar to *Culex saltanensis* but is distinctive in possessing a serrate ventral cornu and a broad external process.

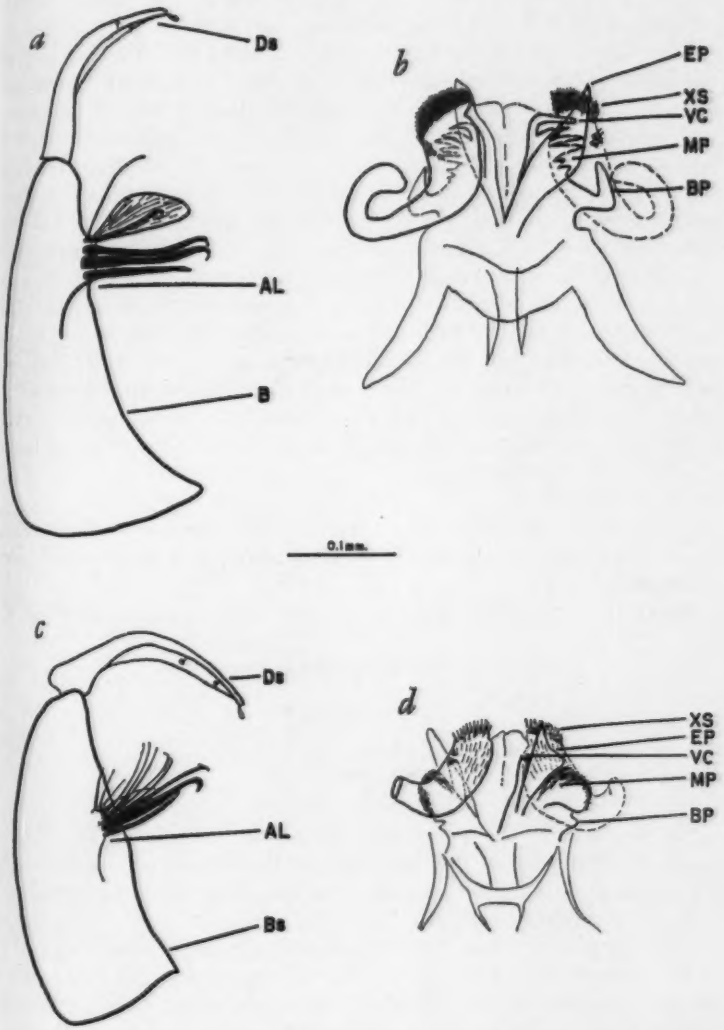

FIGURE 15.—*C. dolosus*, Cohobamba, Bolivia, USNM RB61 8: *a*, basistyle and dististyle; *b*, mesosome. *C. duplicator*, San Francisco Mts., St. Domingo, USNM RB62 101 (paratype): *c*, basistyle and dististyle; *d*, mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, two and a half times as long as the basal width; clothed with fine, short setae in addition to normal, long setal pattern. Apical lobe of the basistyle somewhat flattened, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod fine straight, and pointed; median rod very strong and prominently hooked; apical rod fine, longer than median rod, and gently hooked; six to eight fine subequal setae distad of the rods; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm short, robust, and gently curved; two cercal setae present; except for the basal arm, the tenth sternite is clothed with fine setae. External process very broad basally, then sharply indented and tapering to a point; exceeding the ventral cornu in length. Ventral cornu distinctly separated from the teeth of the median process; serrate terminally. Median process with more than 10 conglomerate teeth. Basal process represented by a small bluntly rounded knob.

Larva: Unknown.

MATERIAL EXAMINED.—The lectotype male, a paratype male, and three other male specimens from Hispaniola, and their associated terminalia.

DISTRIBUTION.—This species is endemic to the island of Hispaniola.

Culex (Culex) erythrothorax Dyar, 1907

FIGURES 16*a*, *b*

Culex (Culex) erythrothorax Dyar, 1907, p. 124.
Culex (Culex) federalis Dyar, 1923a, p. 186.
Culex (Culex) badgeri Dyar, 1924, p. 125.

SYSTEMATICS.—This species is similar to *Culex mauesensis* but differs in the conformation of the structures of the mesosome (particularly the teeth), and the shape of the leaf on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed; median rod broader and slightly longer than basal rod, hooked distally; apical rod as long as median rod and hooked distally; leaf normal, obovate, and with longitudinal striations; two accessory setae present, one very strong and prominently hooked, the other fine and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm long and recurved; two or three cercal setae present.

External process gradually tapering to a blunt tip; exceeding the ventral cornu in length. Ventral cornu dentiform, similar in size and shape to the teeth of the median process. Median process with seven to 10 distinct teeth. Basal process short, straight, and tapering to a point.

Larva: Antennal tuft located in a constriction near the outer third; the basal portion of the antennal shaft spiculate. Postclypeal head hair 4 short, single; upper frontal head hair 5 long, four to seven branched; lower frontal head hair 6 long, three or four branched; preantennal head hair 7 long, multiple. Mentum with approximately 16 subequal teeth. Comb with many scales in a patch; each scale long, broad, and fringed apically with subequal spinules. Siphonal index 6.0 to 7.0; five pairs of small two to four branched siphonal tufts inserted beyond the pecten. Pecten with 11 to 20 teeth on the basal fourth of the siphon; each tooth with three to four coarse barbs on one side. Anal segment completely ringed by the saddle; gills usually about as long as the saddle.

MATERIAL EXAMINED.—Five male specimens and their associated terminalia from Mexico, one from Panama, two from Colombia, and a large series from the United States.

DISTRIBUTION.—Carpenter and LaCasse (1955) reported this species from California, Idaho, and Utah. It has also been reported from Mexico. The author has seen specimens in the U.S. National Museum collection from Panama and Colombia.

Culex (Culex) finlayi Perez Vigueras, 1956

FIGURES 16*c*, *d*

Culex (*Culex*) *finlayi* Perez Vigueras, 1956, p. 382.

SYSTEMATICS.—This species differs from all other members of the subgenus by the characteristic shape of the median process of the mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to normal, long setal pattern. Apical lobe of the basistyle prominent and also clothed with fine setae. Appendicles of the apical lobe as follows: three subequal hooked rods: a small, bluntly rounded leaf: a narrow, gently curved seta. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and spatulate, scalelike spines on the lateral outer margins: basal arm moderate in length, prominently curved; two cercal setae present. External process very broad, gently curved so that the tip is pointed laterally. Ventral cornu serrate. Median process projected into a strong extension

upon which is located a sphincter-form ring; teeth absent. Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper frontal head hair 5 long, multiple; lower frontal head hair 6 long, triple; preantennal head hair 7 long, multiple. Mentum with six teeth on each side of a large central tooth. Siphonal index about 8.0; eight pairs of two to four branched siphonal tufts present on the siphon. Pecten with eight to 12 teeth on the basal fourth of the siphon; the distal tooth is considerably removed from the other teeth; each tooth is long, thin and with numerous barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—None. It is known to the author only from the original description.

DISTRIBUTION.—Known only from the type locality, Casiguas, Province of Havana, Cuba.

Culex (Culex) foliaceus Lane, 1945

FIGURES 17*a*, *b*

Culex (Culex) foliaceus Lane, 1945, p. 206.

SYSTEMATICS.—This is one of the three species characterized by possessing two distinct leaves on the apical lobe of the basistyle. It is distinct from *Culex diplophyllum* by not having annulations on the apical third of the dististyle. It differs from *C. lahillei* by possessing a prominent enlargement at the apex of the dististyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about twice as long as the basal width; clothed with fine setae in addition to the normal, long, setal pattern. Apical lobe of the basistyle prominent, undivided, and clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, gently hooked at the apex; median rod broader and longer than the basal rod, and with a prominent distal hook; apical rod longer than the median rod and prominently hooked; two leaves present, the proximal leaf broad and tapering to an apical point, the distal leaf more narrow, equally as long, and also tapering to a point; no accessory setae present. Dististyle normal but distinctly enlarged at the apex. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; about three cercal setae present. External process gradually tapering to a point, slightly exceeding the ventral cornu in length. Ventral cornu dentiform, slightly larger than, and close to the teeth of the median process. Median process with three to five distinctly separated teeth. Basal process short, straight, and bluntly rounded.

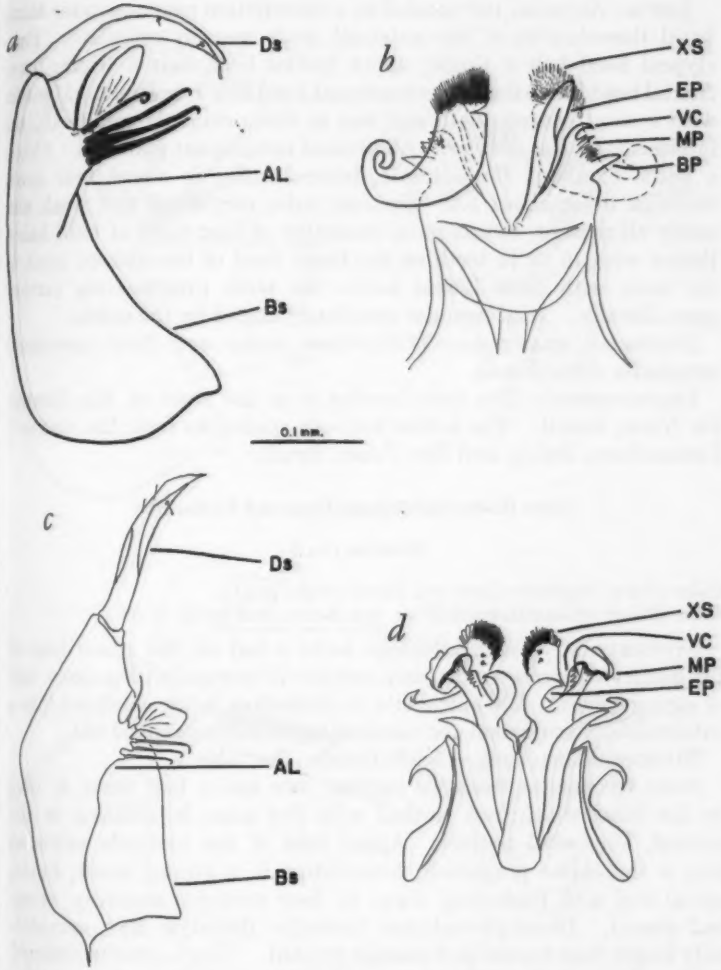

FIGURE 16.—*C. erythrothorax*, Xochimilco, D.F., Mexico, USNM RB62 804: *a*, basistyle and dististyle; *b*, mesosome. *C. finlayi* (drawn after Perez Vigueras, 1956): *c*, basistyle and dististyle; *d*, mesosome.

Larva: Antennal tuft located in a constriction near the outer third; basal three-fourths of the antennal shaft sparsely spiculate. Postclypeal head hair 4 single; upper frontal head hair 5 triple; lower frontal head hair 6 double; preantennal head hair 7 multiple. Mentum with a stout central tooth and two or three stout, lateral teeth, the intermediate ones smaller. Abdominal integument glabrous. Comb a patch of about 75 spatulate, fringed scales in about four rows. Siphonal index about 5.0. Siphonal tufts very small and weak and rarely all present, but at most consisting of four pairs of bifid hairs. Pecten with 10 to 14 teeth on the basal third of the siphon; most of the teeth with three lateral barbs, the teeth progressively farther apart distally. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Thirty-three males and their associated terminalia from Brazil.

DISTRIBUTION.—The type locality is in the state of Rio Grande Do Norte, Brazil. The author has seen specimens from the states of Pernambuco, Bahia, and São Paulo, Brazil.

Culex (*Culex*) *habilitator* Dyar and Knab, 1906

FIGURES 17*c*, *d*

Culex (*Culex*) *habilitator* Dyar and Knab, 1906b, p. 212.
Culex (*Culex*) *eremita* Howard, Dyar, and Knab, 1912 [1913], p. 331.

SYSTEMATICS.—*Culex habilitator* lacks a leaf on the apical lobe of the basistyle; however, the tenth sternite is crowned with a dense tuft of strong spines. The apical lobe is distinctive, being extended into a tuberculiform projection and terminating in a strong apical rod.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, two and a half times as long as the basal width; not clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle extended into a thumblike projection, terminating in a strong, stout, blunt, apical rod and possessing three to four straight accessory setae; leaf absent. Dististyle enlarged medially; dististyle claw considerably longer than normal and sharply pointed. Tenth sternite crowned with a dense tuft of short, pointed spines apically and spatulate, scalelike spines on the lateral outer margins; basal arm reduced to a short, knob; three cercal setae present. External process very broad and somewhat twisted in appearance. Ventral cornu absent. Median process with, at most, one or two poorly defined teeth (teeth generally appear to be absent). Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, three

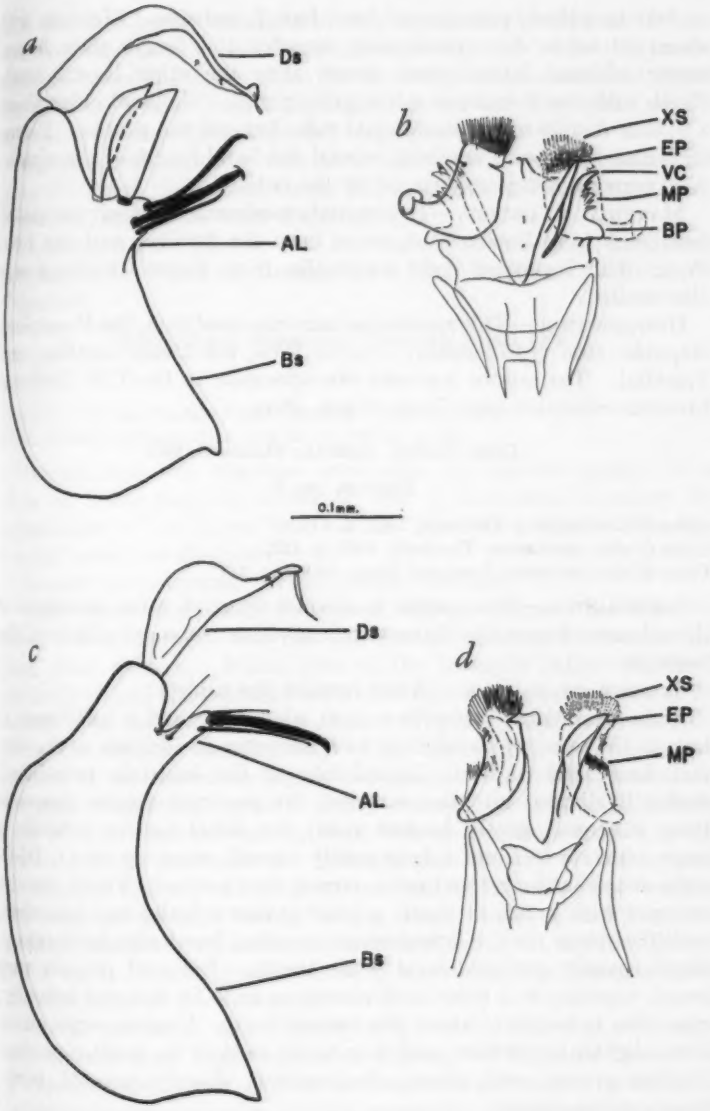

FIGURE 17.—*C. foliaceus*, Bahia, Brazil, USNM RB62 574: *a*, basistyle and dististyle; *b*, mesosome. *C. habilitator*, Guanica, P.R.: *c*, basistyle and dististyle, USNM RB62 22; *d*, mesosome, USNM RB62 14.

or four branched; preantennal head hair 7 multiple. Mentum with about 20 teeth; the apical tooth broader and longer than lateral teeth; subbasal lateral teeth longer than the other lateral teeth. Comb with many scales in a triangular patch. Siphonal index about 8.0; four double or triple siphonal tufts beyond the pecten. Pecten with numerous teeth reaching beyond the basal fourth of the siphon. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Twelve male specimens and their associated terminalia from Puerto Rico, seven from the Antilles, and one from Peru. The lectotype male terminalia from Santo Domingo was also studied.

DISTRIBUTION.—This species has been reported from the Dominican Republic (the type locality), Puerto Rico, the Lesser Antilles, and Trinidad. The author has seen one specimen in the U.S. National Museum collection from Tinga Maria, Peru.

Culex (*Culex*) *inflictus* Theobald, 1901

FIGURES 18*a*, *b*

Culex (*Culex*) *inflictus* Theobald, 1901, p. 115.
Culex (*Culex*) *scholasticus* Theobald, 1901, p. 120.
Culex (*Culex*) *extricator* Dyar and Knab, 1906b, p. 211.

SYSTEMATICS.—This species is distinct from all other members of the subgenus due to the characteristic division of the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about two and a half times as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent; distinctly divided into two sections; the proximal section possesses three subequal, gently hooked rods; the distal section exhibits a large, obovate leaf and a long gently curved accessory seta. Dististyle somewhat longer and more narrow than normal. Tenth sternite crowned with a tuft of short, pointed spines apically and spatulate, scalelike spines on the lateral outer margins; basal arm moderate in length, gently curved; cercal setae absent. External process very broad, tapering to a point, and curved so as to be directed laterally; extending in length to about the ventral cornu. Ventral cornu dentiform, slightly larger than, and close to the teeth of the median process. Median process with about nine narrow, sharply pointed teeth. Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper frontal head hair 5 long, four branched; lower frontal head hair 6 long, triple; preantennal head hair 7 multiple. Mentum

with about 17 teeth; the apical tooth considerably broader and longer than the lateral teeth. Comb with numerous narrow scales in a patch. Siphonal index about 6.0; three double or triple siphonal tufts beyond the pecten. Pecten with numerous teeth on the basal third of the siphon. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—One adult male and associated terminalia from Colombia, four from Costa Rica, nine from Panama, 13 from Venezuela, and three from Trinidad.

DISTRIBUTION.—This species has been reported from the Lesser Antilles, Cuba, Trinidad, Mexico, Costa Rica, Panama, Colombia, and Venezuela.

Culex (Culex) interrogator Dyar and Knab, 1906

FIGURES 18*c*, *d*

Culex (Culex) interrogator Dyar and Knab, 1906b, p. 209.
Culex (Culex) reflector Dyar and Knab, 1909*a*, p. 256.

SYSTEMATICS.—In the male terminalia this species appears to be close to *Culex peus*, *C. stenolepis*, and *C. thriambus;* however, the appendicles of the apical lobe of the basistyle and the distinctive ventral cornu are diagnostic.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle rather flattened, undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: three fine, subequal, gently curved rods; a narrow, bluntly rounded leaf which exhibits minute longitudinal striations; two accessory setae, one straight the other prominently hooked. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; cercal setae absent. External process very broad, tapering to a point, and curved so as to be directed laterally; not reaching the ventral cornu. Ventral cornu large, rounded and rugulose. Median process with five to seven sharply pointed, distinctly separated teeth. Basal process not a distinct arm, but represented by a round bulge of the mesosome.

Larva: Antennal tuft located in a constriction near the outer fourth; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, triple; preantennal head hair 7 long, multiple. Mentum with approximately 17 teeth; the apical tooth broader and longer than the lateral teeth. Thorax sparsely spiculate. Comb with numerous scales in a patch; each scale long, narrow, with apex expanded and fringed with subequal spinules. Siphonal index 3.0 to 3.5; four pairs of

double or triple siphonal tufts present. Pecten with numerous teeth extending to the distal third of the siphon; each tooth with three to five coarse barbs on one side, except for the apical three to six teeth which are large, spinelike and without lateral teeth. Anal segment completely ringed by the saddle.

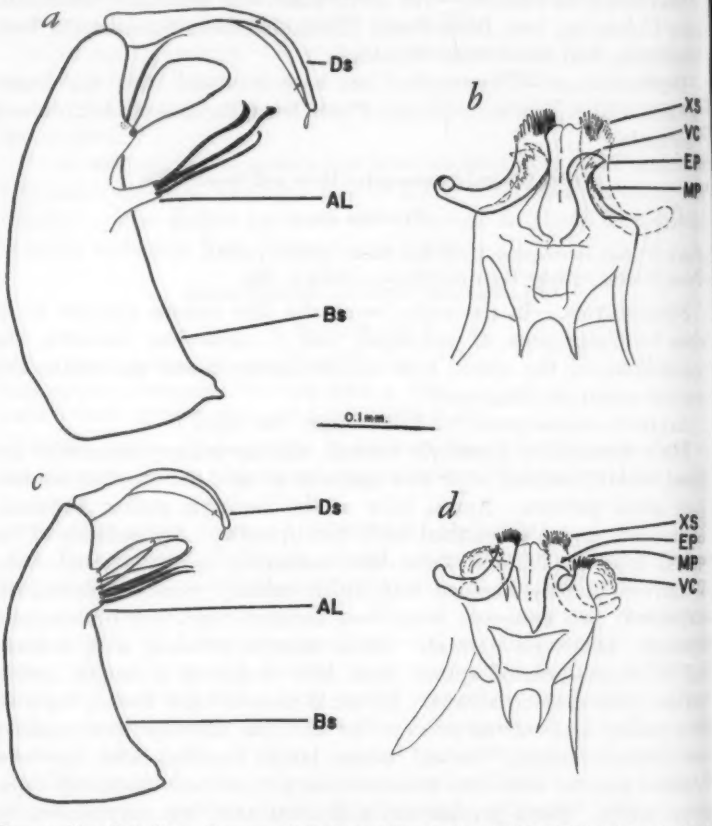

FIGURE 18.—*C. inflictus*, Ocumare de la Costa, Venezuela, USNM RB62 457: *a*, basistyle and dististyle; *b*, mesosome. *C. interrogator*, Panama, C.Z.: *c*, basistyle and dististyle USNM RB61 325; *d*, mesosome, USNM RB62 399.

MATERIAL EXAMINED.—One adult male specimen and associated terminalia from El Salvador, three from Mexico, and 15 from Panama. The lectotype male terminalia from Rincon Antonio, Mexico, was also studied.

DISTRIBUTION.—Reported from Texas, Mexico, El Salvador, Nicaragua, and Panama.

Culex (Culex) janitor Theobald, 1903

FIGURES 19*a*, *b*

Culex (Culex) janitor Theobald, 1903a, p. 183.

SYSTEMATICS.—The generalized mesosome of this species makes it rather similar to a large number of species, but the appendicles of the apical lobe of the basistyle are distinctive.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and bluntly rounded; median rod more robust, and slightly longer than the basal rod, and with a prominent terminal hook; apical rod more slender than the median or basal rods and with a prominent terminal hook; leaf moderate in size, obovate; two accessory setae present, one straight, the other longer and gently hooked; a small, straight seta may also be next to the leaf. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; one to two cercal setae present. External process gradually tapering to a point, slightly exceeding the ventral cornu in length. Ventral cornu dentiform, slightly larger than, and close to the teeth of the median process. Median process with about five distinct, sharply pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Antenna fusiform; a short, reduced tuft located near the middle. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 long, multiple. Mentum with about 21 teeth; the apical tooth broad and large, the lateral teeth progressively smaller apically. Body glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 4.0; five siphonal tufts present on the siphon, the apical and subapical tufts being double, the basal tufts multiple and located within the pecten. Pecten with about seven teeth, restricted to the basal third of the siphon; apical tooth considerably separated from the rest of the pecten. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Eight adult males and associated terminalia from Jamaica, six from Puerto Rico, and one from Colombia.

DISTRIBUTION.—This species has been reported from Jamaica and Puerto Rico. The author has seen one specimen in the U.S. National Museum collection from Bogotá, Colombia (RB62 133).

Culex (*Culex*) *lahillei* Bachmann and Casal, 1962

FIGURES 19*c*, *d*

Culex (*Culex*) *lahillei* Bachmann and Casal, 1962, p. 267.

SYSTEMATICS.—This species possesses two leaves on the apical lobe of the basistyle and is, therefore, related to *Culex diplophyllum* and *C. foliaceus*; however, it does not exhibit an apical enlargement or annulations on the dististyle. Other characters of the mesosome are also distinctive.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width. Apical lobe of the basistyle rather flattened, undivided. Appendicles of the apical lobe as follows: three subequal, strong, hooked rods; a prominently hooked accessory seta; two leaves, the proximal leaf broad and tapering to an apical point, the distal leaf narrow and bluntly rounded at the apex. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved. External process gradually tapering to a point, slightly exceeding the ventral cornu in length. Ventral cornu dentiform, close to the teeth of the median process. Median process with about nine distinct, sharply pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Unknown.

MATERIAL EXAMINED. -The holotype male terminalia (INM 5219).

DISTRIBUTION.—That of the type locality, Achiras, Cordoba, Argentina.

Culex (*Culex*) *laticlasper* Galindo and Blanton, 1954

FIGURE 20*a*

Culex (*Culex*) *laticlasper* Galindo and Blanton, 1954, p. 209.

SYSTEMATICS.—*Culex laticlasper* is very similar to other species which possess a reduced mesosome. It is distinguished from *C. brethesi* and *C. restuans* by the appendicles of the apical lobe of the basistyle. It differs from *C. acharistus* by lacking the annulations of the dististyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, not quite twice as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and bluntly rounded; median rod more robust, and longer than the basal rod and with a prominent hook at the apex; apical rod longer than the median rod and hooked; leaf moderate in size, obovate; two accessory setae present, one long and gently curved, the other almost as strong as the apical rod and

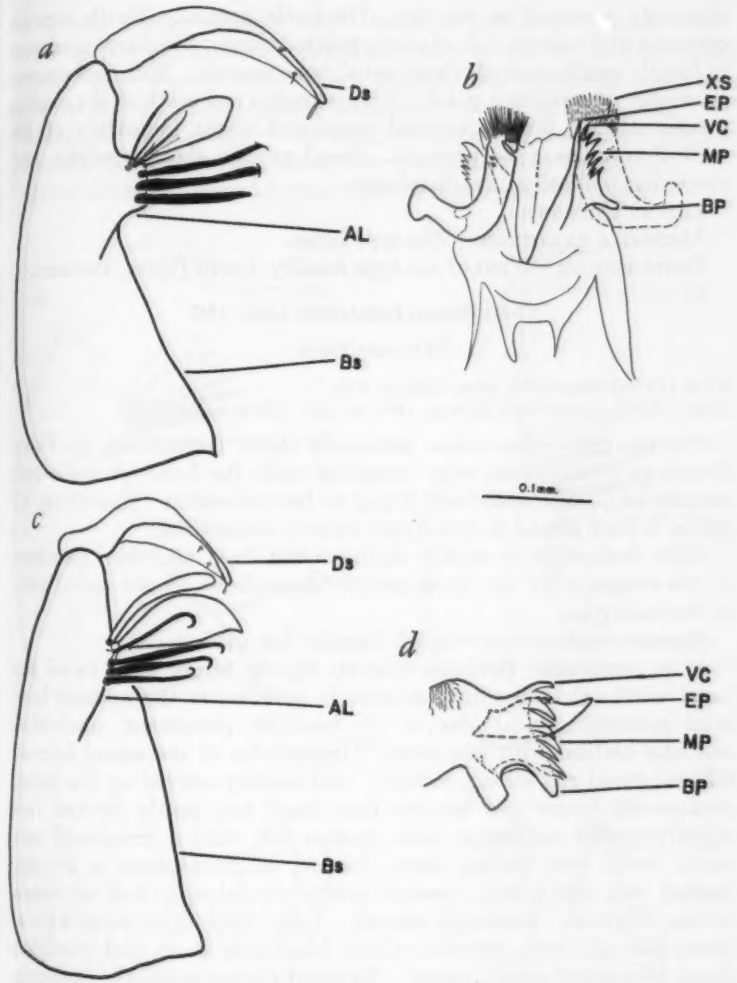

FIGURE 19.—*C. janitor*, Jamaica, USNM RB62 395: *a*, basistyle and dististyle; *b*, mesosome *C. lahillei*, Cordoba, Argentina, INM 5219 (holotype): *c*, basistyle and dististyle; *d*, mesosome (everted).

distinctly recurved at the tip. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; three cercal setae present. External process gradually tapering to a point. Ventral cornu and teeth of the median process absent (in the everted position a slight indication of the ventral cornu may be present). Basal process short, straight, and somewhat pointed at the distal end.

Larva: Unknown.

MATERIAL EXAMINED.—The type series.

DISTRIBUTION.—That of the type locality, Cerro Punta, Panama.

Culex (Culex) levicastilloi Lane, 1945

FIGURES 20*b–d*

Culex (*Culex*) *levicastilloi* Lane, 1945, p. 209.
Culex (*Culex*) *tejerai* Cova Garcia, 1962, p. 312. [New synonymy.]

SYSTEMATICS.—Two male terminalia slides determined by Cova Garcia as *Culex tejerai* were compared with the holotype male terminalia of *C. levicastilloi* and found to be conspecific. Therefore, *C. tejerai* is here placed in synonymy with *C. levicastilloi*.

Culex levicastilloi is readily distinguished from all other members of the subgenus by the characteristic appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and slightly curved at the apex; median rod longer and broader than basal rod, gently hooked terminally; apical rod longer than median rod, with a prominent terminal hook; two strong, short, serrate, plumose setae; a strong, hooked seta and a long, narrow, gently curved seta; leaf moderate in size, obovate. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm short and straight; about four cercal setae present. External process gradually tapering to a point, reaching the ventral cornu in length. Ventral cornu dentiform, very similar in size and shape to the teeth of the median process. Median process with about four distinct teeth. Basal process short, straight, pointed, and directed posteriorly.

Larva: The larval stage was described by Cova Garcia (1962) as *Culex tejerai*. Antennal tuft located in a constriction near the outer third. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, four branched; preantennal head hair 7 long, multiple. Mentum with about 13 teeth; the apical tooth larger than

the lateral teeth. Thorax and abdomen spiculose. Comb with numerous teeth in a patch. Siphonal index about 6.0; five multiple siphonal tufts beyond the pecten. Pecten with numerous teeth on the basal fourth. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—The holotype male and associated terminalia, and the male terminalia of two specimens from Venezuela.

DISTRIBUTION.—Ecuador (the type locality), and Venezuela.

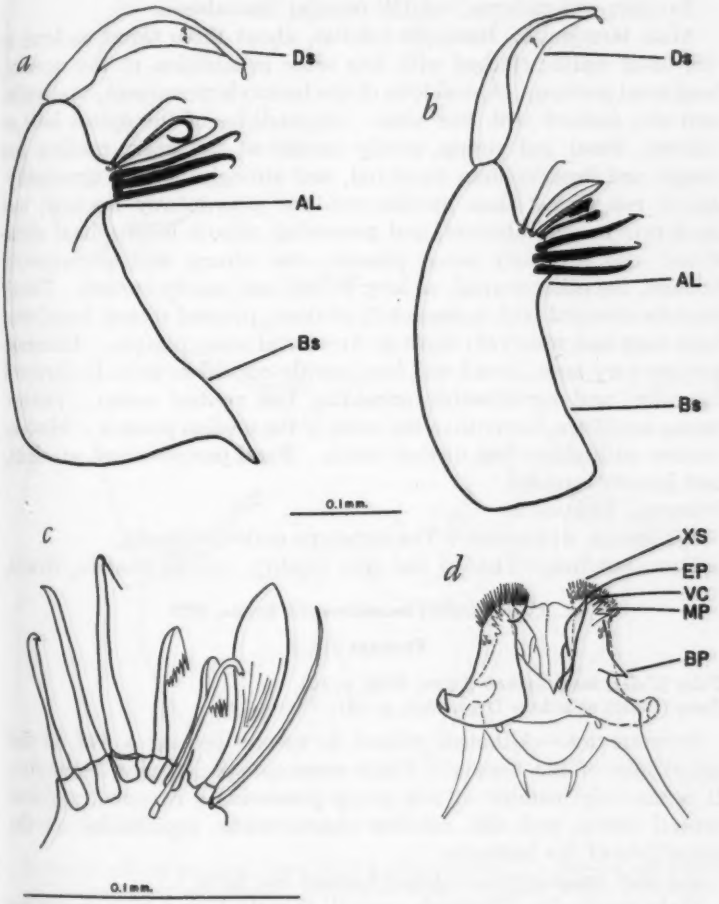

FIGURE 20.—*C. laticlasper*, Cerro Punta, USNM MT-00193 (paratype): *a*, basistyle and dististyle. *C. levicastilloi: b*, basistyle and dististyle; *c*, apical lobe of basistyle (enlarged); *d*, mesosome.

Culex (Culex) lygrus Root, 1927

FIGURES 21*a*, *b*

Culex (Culex) lygrus Root, 1927, p. 579.

SYSTEMATICS.—This species is similar to *Culex renatoi*, *C. mauesensis*, and *C. pinarocampa*. It is distinctive by having a reduced number of teeth on the median process of the mesosome and by the characteristic external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, about three times as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, gently curved at the apex; median rod longer and broader than basal rod, and strongly hooked terminally; apical rod longer than median rod and prominently hooked; leaf moderate in size, obovate, and possessing minute longitudinal striations; two accessory setae present, one strong and prominently hooked, the other normal, as long as leaf, and gently curved. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm very long and recurved; three to five cercal setae present. External process very large, broad and long, gently curved so as to be directed laterally, and considerably exceeding the ventral cornu. Ventral cornu dentiform, larger than the teeth of the median process. Median process with about four distinct teeth. Basal process short, straight, and bluntly rounded.

Larva: Unknown.

MATERIAL EXAMINED.—The lectotype male terminalia.

DISTRIBUTION.—That of the type locality, Rio de Janeiro, Brazil.

Culex (Culex) maracayensis Evans, 1923

FIGURES 21*c*, *d*

Culex (Culex) maracayensis Evans, 1923, p. 102.
Culex (Culex) aglischrus Dyar, 1924, p. 121.

SYSTEMATICS.—Although related to species lacking a leaf on the apical lobe of the basistyle, *Culex maracayensis* is quite distinctive. It is the only member of this group possessing a rounded, rugulose ventral cornu, and also exhibits characteristic appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine spicules in addition to the normal long setal pattern. Apical lobe of the basistyle prominent, extended into a thumblike projection. Appendicles of the apical lobe as follows:

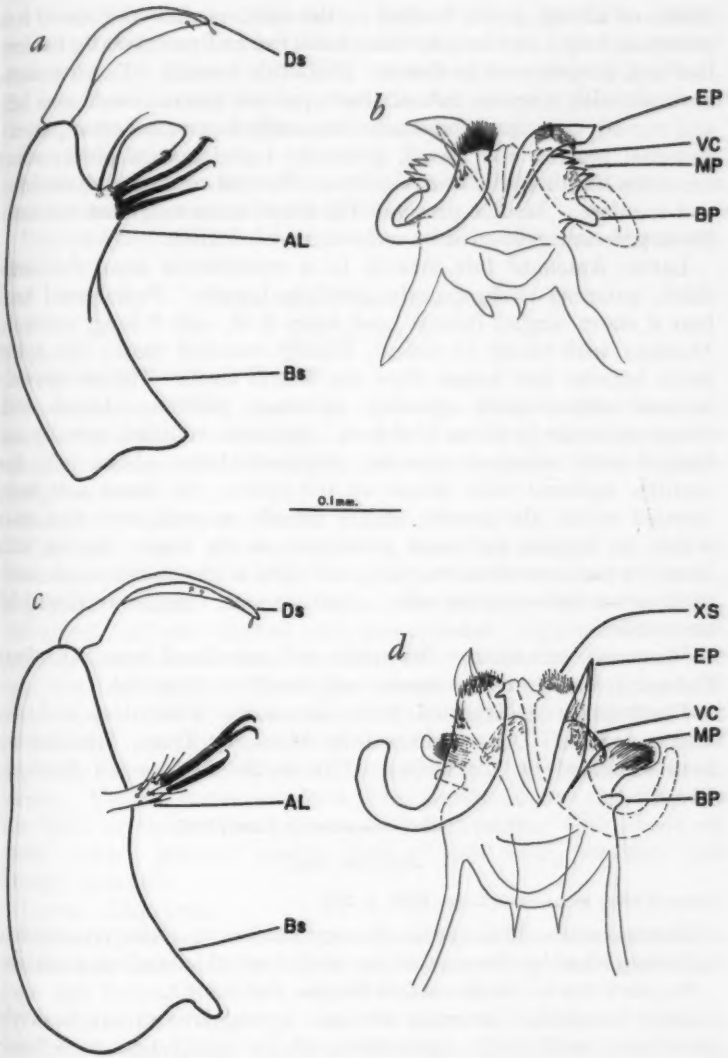

FIGURE 21.—*C. lygrus*, Mage, Brazil, USNM 115–2 (lectotype): *a*, basistyle and dististyle; *b*, mesosome. *C. maracayensis*, Rio Grande Forest, Trinidad, TRVL 19 VI 61–3: *c*, basistyle and dististyle; *d*, mesosome.

basal rod strong, gently hooked at the apex; median and apical rods subequal, longer and broader than basal rod and prominently hooked; leaf and accessory setae absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm long and curved; a group of about nine, unusually long cercal setae present. External process very broad, gradually tapering to a point; about twice the length of the ventral cornu. Ventral cornu large, rounded, and rugulose. Median process with ten or more conglomerate teeth. Basal process represented by a short, rounded knob.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft sparsely spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 long, multiple. Mentum with about 13 robust, bluntly rounded teeth; the apical tooth broader and longer than the lateral teeth. Thorax sparsely covered with minute spicules; abdomen glabrous. Comb with numerous scales in about four rows; each scale rounded apically and fringed with subequal spinules. Siphonal index about 5.5; five multiple siphonal tufts placed on the siphon, the basal tuft being inserted within the pecten; siphon densely covered with fine setae which are longest and most prominent at the apex. Pecten with about 11 teeth restricted to the basal third of the siphon; each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Six males and associated terminalia from Colombia, four from Venezuela, and one from Trinidad.

DISTRIBUTION.—Reported from Venezuela, Colombia, and the Lesser Antilles. One specimen from Macauley Trace, Trinidad has been examined by the author. This is the first record from the island.

Culex (Culex) mauesensis Lane, 1945

FIGURES 22*a*, *b*

Culex (Culex) mauesensis Lane, 1945, p. 208.

SYSTEMATICS.—This species is very similar to *Culex renatoi*, but is distinguished by the appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical. Apical lobe of the basistyle prominent, undivided. Appendicles of the apical lobe as follows: basal rod strong, gently curved; median and apical rods subequal, longer than the basal rod, and prominently hooked terminally; leaf broad, obovate, and with minute longitudinal striations; two accessory setae present, one normal and gently curved, the other very strong,

and broadly flattened at the apex. Ventral cornu dentiform, similar in size and shape to the teeth of the median process. Median process with two series of teeth, the first consists of four very large teeth, the second consists of six or seven smaller, sharply pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Unknown.

MATERIAL EXAMINED.—None. Known to the author from the descriptions of Lane (1945 and 1953).

DISTRIBUTION.—That of the type locality, Maues, Amazonas, Brazil.

Culex (Culex) maxi Dyar, 1928

FIGURES 22*c*, *d*

Culex (*Culex*) *maxi* Dyar, 1928, p. 386.

SYSTEMATICS.—This species is similar to *Culex brevispinosus*, *C. surinamensis*, and *C. oswaldoi*. It differs in the appendicles on the apical lobe of the basistyle and in the conformation of the structures of the mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, about three times as long as the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle rather flattened, undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: about six subequal, straight, fine setae present; rods and leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm very long and prominently curved; two cercal setae present. External process gradually tapering to a point; not reaching the ventral cornu in length. Ventral cornu dentiform, very similar in size and shape to the teeth of the median process. Median process with about six short, robust, pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Unknown.

MATERIAL EXAMINED.—Seven males and their associated terminalia from Brazil, and two from Argentina. The lectotype male terminalia from San Pedro, Argentina was also studied.

DISTRIBUTION.—Reported from the state of Tucuman, Argentina (the type locality), and the states of Bahia and Rio Grande do Norte, Brazil. The author has seen specimens in the U.S. National Museum collection from Recife, Pernambuco, Brazil, and Piedade, São Paulo, Brazil.

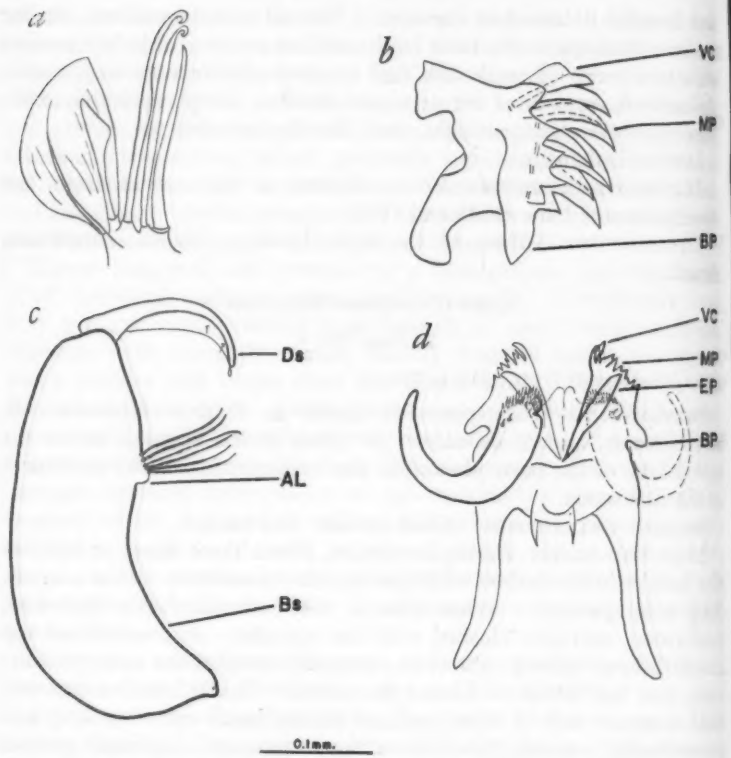

FIGURE 22.—*C. mauesensis* (drawn after Lane, 1945): *a*, apical lobe of basistyle; *b*, mesosome. *C. maxi*, Bahia, Brazil, USNM RB62 209: *c*, basistyle and dististyle; *d*, mesosome.

Culex (Culex) mollis Dyar and Knab, 1906

FIGURES 23, 24*a–f*

Culex (Culex) mollis Dyar and Knab, 1906a, p. 171.
Culex (Culex) lateropunctata Theobald, 1907, p. 458.
Culex (Culex) equivocator Dyar and Knab, 1907, p. 203.
Culex (Culex) elocutilis Dyar and Knab, 1909a, p. 255.
Culex (Culex) lepostenis Dyar, 1923b, p. 70.
Culex (Culex) tisseuilli Senevet, 1937, p. 375. [New synonymy.]

SYSTEMATICS.—Senevet (1937) described *Culex tisseuilli* from French Guiana and recognized that it was extremely close to *C. mollis*. The primary distinguishing character was the reduced number of teeth on the median process of the mesosome. All available male specimens of *C. mollis* were examined to determine variation in the number of teeth. Figure 23 summarizes data from this investigation. X is the

mean number of teeth; M is the mode; and R is the range in the number of teeth for the given area. N is the number of observations in each sample. Each observation consists of the number of teeth on only one side of the mesosome. Thus, a single individual could contribute two observations to the sample. In 35 of the 97 specimens examined, there was a difference in the number of teeth on each side of the mesosome. Variation in the number of teeth of specimens examined in this study ranged from three to 12 and the number appeared to be larger on the west coast and smaller on the east coast. This indicates that the number of teeth on the median process of the mesosome is not a significant character and since there are no other major differentiating characteristics between these two species, *C. tisseuilli* is here placed in synonymy with *C. mollis*.

Although a generalized arrangement of appendicles on the apical lobe of the basistyle exists, this species is readily distinguished from all other members of the subgenus by the characteristic, extremely large, T-shaped ventral cornu.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed at the apex; median rod longer and broader than basal rod, and prominently hooked; apical rod longer than median rod and also prominently hooked; leaf moderate in size, obovate; two accessory setae present, one fine and hooked distally, the other very strong, longer than the leaf, and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length and curved; two cercal setae present. External process gradually tapering to a point, reaching slightly farther than the ventral cornu. Ventral cornu extremely large, T-shaped, and distinctly separated from the teeth of the median process. The ventral cornu is quite variable in size and general conformation; figures 24*c–f* demonstrates some of the variations in shape which this structure may assume. Median process with three to 12 sharply pointed, distinctly separated teeth. Geographical variation in the number of mesosomal teeth may be seen in figure 23. Examination of the mean, mode, and range of collections from various areas indicates that specimens collected on the west coast of South America have considerably more teeth than those collected on the east coast. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft sparsely spiculate basally. Postclypeal head hair 4 long,

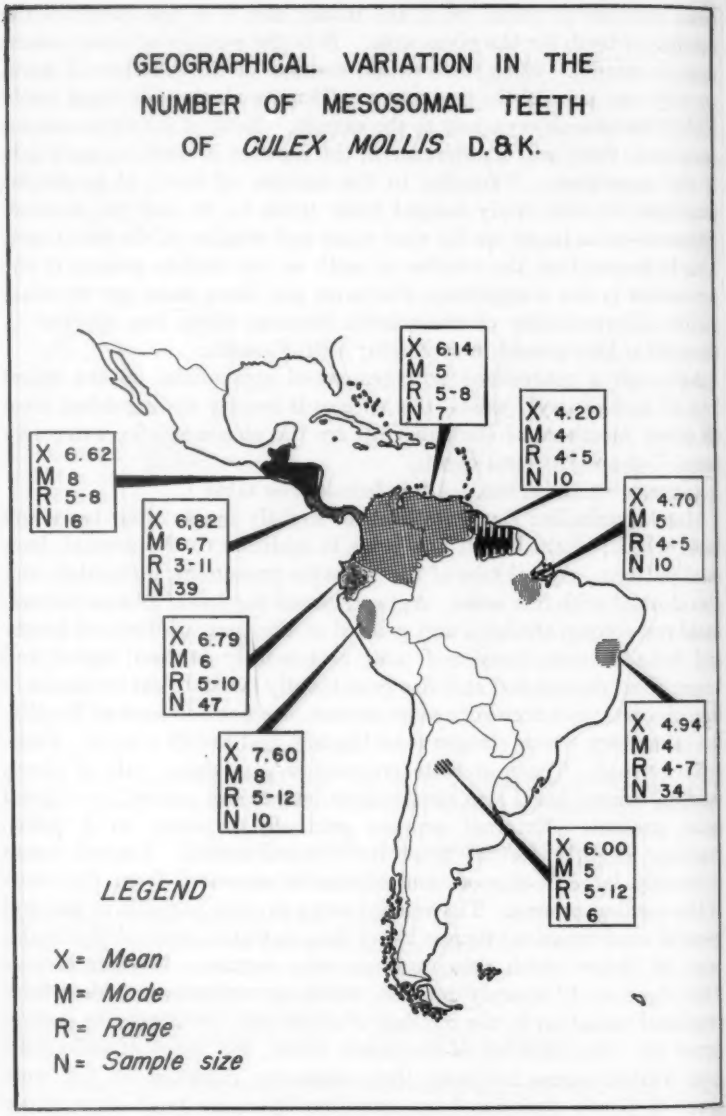

FIGURE 23.—Geographical variation in the number of mesosomal teeth of *Culex mollis* Dyar and Knab.

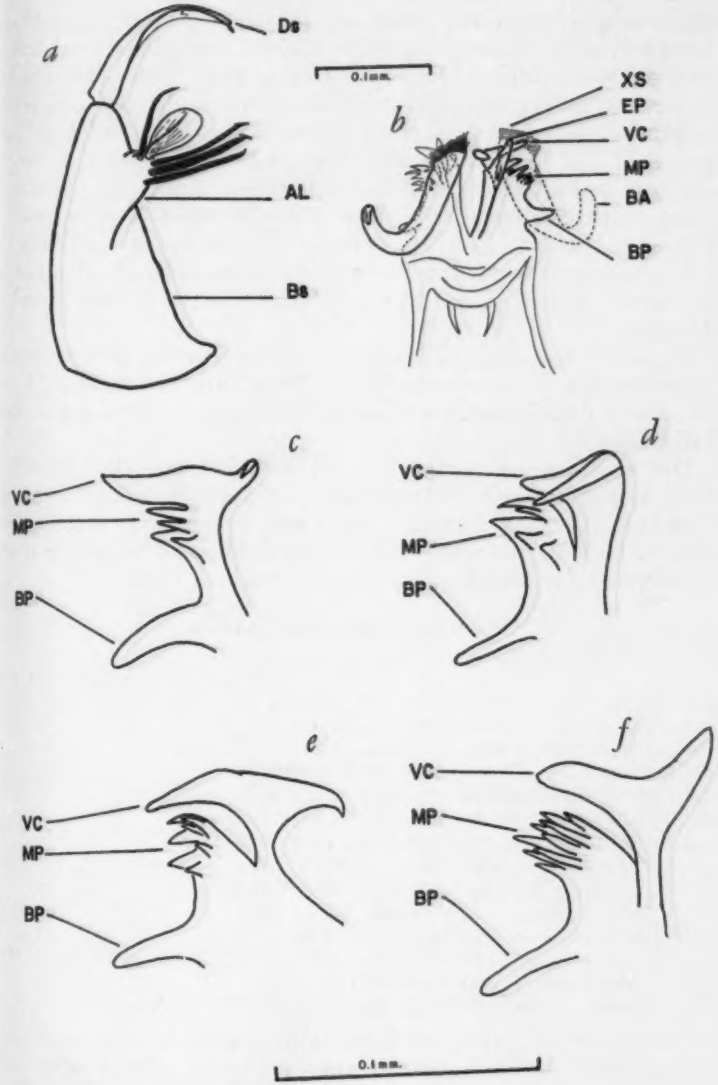

FIGURE 24.—*C. mollis*. Basistyle and dististyle: *a*, USNM RB62 693, El Valle, Panama. Mesosome: *b*, USNM RB62 693, El Valle, Panama; *c*, USNM M87, Surinam; *d*, USNM RB61 243, Bahia, Brazil; *e*, USNM 1650, Panama, C.Z.; *f*, USNM 29 III 28c, Rio Perone, Peru.

fine, single; upper frontal head hair 5 long, five branched, barbed; lower frontal head hair 6 long, triple, barbed; preantennal head hair 7 multiple, long, barbed. Mentum with about 19 teeth; the apical tooth larger and broader than the lateral teeth; the two basal lateral teeth larger than the other lateral teeth. Thorax minutely spiculate; abdomen glabrous. Comb with numerous scales in a triangular patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 5.0; with three pairs of double siphonal tufts located beyond the pecten. Pecten with about 12 teeth on the basal third of the siphon; each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle, which possesses distinct spicules dorsally.

MATERIAL EXAMINED.—There were 137 adult male specimens and associated terminalia from Argentina, Brazil, British Guiana, Colombia, Costa Rica, Honduras, Panama, Peru, Surinam, Venezuela, and Trinidad.

DISTRIBUTION.—Reported from Trinidad (the type locality), Mexico, Honduras, British Honduras, Costa Rica, Panama, Colombia, Venezuela, Guianas, Ecuador, Peru, and Brazil. The author has examined specimens in the U.S. National Museum collection from Monteros and Concepción, Tucuman, Argentina.

Culex (Culex) nigripalpus Theobald, 1901

FIGURES 25*a*, *b*

Culex (*Culex*) *nigripalpus* Theobald, 1901, p. 322.
Culex (*Culex*) *palus* Theobald, 1903a, p. 194.
Culex (*Culex*) *similis* Theobald, 1903a, p. 207.
Culex (*Culex*) *biocellatus* Theobald, 1903b, p. 224.
Culex (*Culex*) *microsquamosus* Theobald, *in* Grabham, 1905, p. 407.
Culex (*Culex*) *mortificator* Dyar and Knab, 1906b, p. 210.
Culex (*Culex*) *carmodyae* Dyar and Knab, 1906b, p. 210.
Culex (*Culex*) *factor* Dyar and Knab, 1906b, p. 212.
Culex (*Culex*) *regulator* Dyar and Knab, 1906b, p. 213.
Culex (*Culex*) *microannulata* Theobald, 1907, p. 481.
Culex (*Culex*) *proximus* Dyar and Knab, 1909b, p. 38.
Culex (*Culex*) *caraibeus* Howard, Dyar, and Knab, 1912 [1913], p. 333.
Culex (*Culex*) *prasinopleurus* Martini, 1914, p. 68.
Culex (*Culex*) *azuayus* Levi-Castillo, 1954, p. 264. [New synonymy.]

SYSTEMATICS.—A specimen in the U.S. National Museum collection labeled by Levi-Castillo as *Culex azuayus* from the type locality, has been thoroughly studied and appears to be the specimen from which the original figure of *C. azuayus* was made. There is no doubt that this is a specimen of *C. nigripalpus*. Since the type material is improperly labeled and the description of *C. azuayus* is vague and incomplete, *C. azuayus* is here placed into synonymy with *C. nigripalpus*.

Culex nigripalpus is similar to several species possessing a dentiform ventral cornu and spatulate spines on the outer lateral margins of the tenth sternite. It differs, however, in the arrangement and number of appendicles on the apical lobe of the basistyle and in the conformation of the structures of the mesosome.

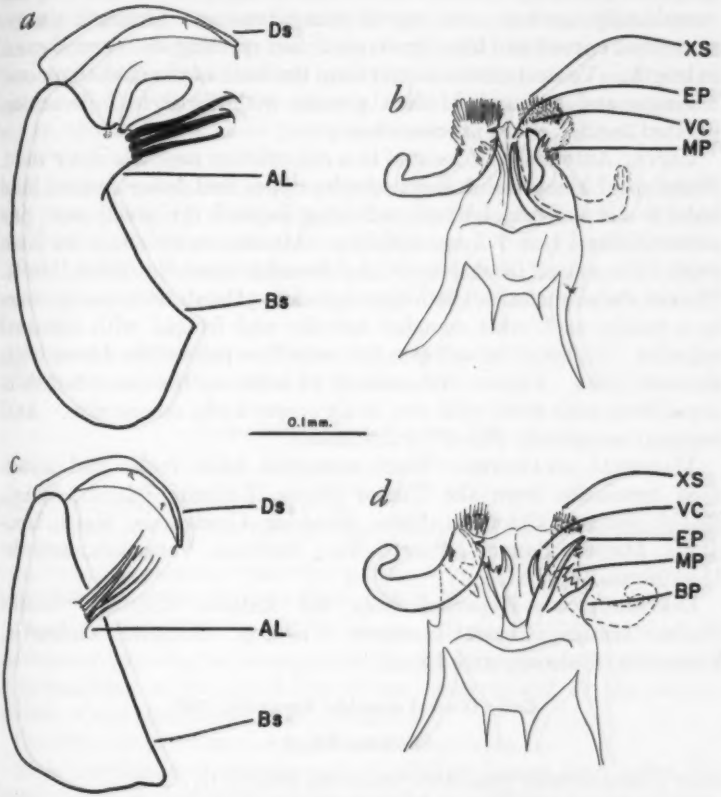

FIGURE 25.—*C. nigripalpus*, Bahia, Brazil, USNM RB62 163; *a*, basistyle and dististyle *b*, mesosome. *C. oswaldoi*, Natal, Brazil, USNM RB62 290 (holotype): *c*, basistyle and dististyle; *d*, mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: basal rod strong, straight, blunt; median rod longer and

broader than basal rod and terminating in a prominent hook; apical rod longer than median rod, also prominently hooked terminally; leaf moderate in size, obovate; one long, gently curved accessory seta present. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and approximately eight spatulate, scalelike spines on the lateral outer margins; basal arm long and prominently curved; two cercal setae present. External process somewhat curved and bluntly rounded; not reaching the ventral cornu in length. Ventral cornu distinct from the teeth of the median process, truncate and serrate. Median process with three to four strong, pointed teeth. Basal process absent.

Larva: Antennal tuft located in a constriction near the outer third. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 triple, barbed, extending beyond the preclypeus; preantennal head hair 7 long, multiple. Mentum with about 23 blunt teeth; the apical tooth longer and broader than the lateral teeth. Thorax densely clothed with fine spicules. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 6.0 to 7.0; with four pairs of double or triple siphonal tufts. Pecten with nine to 15 teeth on the basal fourth of the siphon; each tooth with two to six coarse barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—There were 142 adult males and associated terminalia from the United States, Bahama Islands, Brazil, British Guiana, Colombia, Cuba, Ecuador, Guatemala, Haiti, Honduras, Mexico, Panama, Puerto Rico, Surinam, Venezuela, and the Dominican Republic.

DISTRIBUTION.—Reported from the Antilles, southern United States, Mexico, Central America, Trinidad, Ecuador, Colombia, Venezuela, Guianas, and Brazil.

Culex (Culex) oswaldoi Forattini, 1965

FIGURES 26*c*, *d*

Culex (*Culex*) *oswaldoi* Bram [sic].—Forattini, 1965, p. 167.

SYSTEMATICS.—This species is a member of the group lacking a leaf on the apical lobe of the basistyle. It is distinct from the other members, however, in the number and conformation of the appendicles on the apical lobe of the basistyle and in the structures of the mesosome.

SALIENT CHARACTERS.—Adult female: Unknown.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle somewhat flattened,

undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: rods absent; a group of about seven long, pointed, gently curved setae evenly distributed; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed spines; basal arm moderate in length, strongly curved; two or three cercal setae present. External process gradually tapering to a blunt point; considerably exceeding the ventral cornu in length. Ventral cornu dentiform, but very large and distinctly separated from the teeth of the median process. Median process with about four, small, sharply pointed, subequal teeth. Basal process moderate in size, tapering to a blunt point, and directed posterolaterally.

Larva: Unknown.

HOLOTYPE.—An adult male and associated slide mounted terminalia with the following data: Natal, Brazil; Macaphyba; VII–23–43; MacCreary, Colr.; reared quarry hole; Serial No. 12; RB62 290. USNM 67550; deposited in the U.S. National Museum. I take great pleasure in naming this species in honor of Dr. Oswaldo P. Forattini.

MATERIAL EXAMINED.—The holotype male.

DISTRIBUTION.—That of the type locality.

Culex (Culex) peus Speiser, 1904

FIGURES 26*a*, *b*

Culex (*Culex*) *affinis* Adams, 1903, p. 25.
Culex (*Culex*) *peus* Speiser, 1904, p. 148. [New name for *affinis* Adams, not Stephens, 1825.]
Culex (*Culex*) *stigmatosoma* Dyar, 1907, p. 123.
Culex (*Culex*) *cumimetes* Dyar and Knab, 1908, p. 61.

SYSTEMATICS.—This species is similar to *Culex chidesteri* and *C. interrogator* but may be distinguished by the arrangement and number of appendicles on the apical lobe of the basistyle and by the conformation of the structures of the mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with minute spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with minute spicules. Appendicles of the apical lobe as follows: basal rod strong, straight, and bluntly rounded; median rod longer and broader than basal rod and terminating in a prominent hook; apical rod longer than, but not as broad as median rod, terminating in a gentle hook; leaf small, pointed distally, and possessing distinct longitudinal striations; two accessory setae present, one prominently hooked, the other gently curved and pointed. Dististyle normal. Tenth sternite crowned with a dense tuft of short,

pointed spines; basal arm moderate in length, strongly curved; two cercal setae present. External process very broad medially, gradually tapering to a point; just reaching the ventral cornu in length. Ventral cornu large, round, and rugulose. Median process with four to eight distinct, pointed teeth. Basal process rather broad, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 four to seven branched, barbed; preantennal head hair 7 multiple. Mentum with about 15 teeth; the apical tooth broader and longer than the lateral teeth; the subbasal teeth longer than the other lateral teeth. Thorax glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 4.0 to 5.0; with five pairs of siphonal tufts, the subapical pair out of line and double. Pecten with nine to 15 teeth on the basal third of the siphon; each tooth with one to five coarse barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Thirty-nine males and associated terminalia from the United States, Mexico, and Costa Rica.

DISTRIBUTION.—Reported from the western United States, Mexico, Guatemala, El Salvador, Costa Rica, Colombia, and Venezuela.

Culex (Culex) pinarocampa Dyar and Knab, 1908

FIGURES 26*c*, *d*

Culex (*Culex*) *pinarocampa* Dyar and Knab, 1908, p. 59.

SYSTEMATICS.—The male terminalia indicates that this is a rather generalized species, but characters of the apical lobe of the basistyle and the mesosome distinguish it from other members of the subgenus.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle tubular, slightly longer than three times the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and blunt; median rod longer and broader than basal rod, and prominently hooked; apical rod longer than, but not as broad as the median rod, also prominently hooked terminally; leaf moderate in size, obovate; two accessory setae present, one distinctly hooked terminally, the other as long as the leaf, gently curved, and pointed. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; two to four cercal setae present in a compact group. External process gradually tapering

to a point; slightly exceeding the ventral cornu in length. Ventral cornu clavate, tricleft, distinctly separated from the teeth of the median process. Median process with about four strong, pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, double; upper and lower frontal head hairs 5 and 6 three or four branched, long; preantennal head hair 7 long, multiple. Mentum

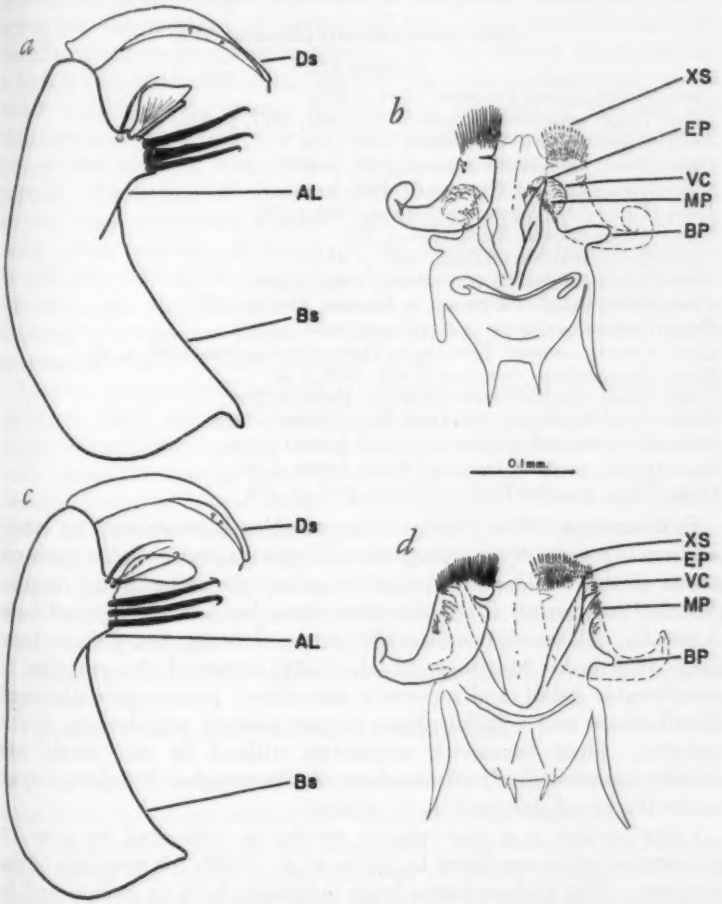

FIGURE 26.—*C. peus*, Montes de Oca, Costa Rica, USNM RB62 387: *a*, basistyle and dististyle; *b*, mesosome. *C. pinarocampa*, Cordoba, Mexico, USNM RB61 53: *c*, basistyle and dististyle; *d*, mesosome.

with about 17 teeth; the apical tooth broader and larger than the lateral teeth; lateral teeth becoming progressively smaller apically. Body glabrous. Comb with numerous scales in a patch. Siphonal index about 6.0; four pairs of double siphonal tufts. Pecten with numerous teeth on the basal third of the siphon. Anal segment completely ringed by the saddle, spiculate dorsally.

MATERIAL EXAMINED.—A paratype adult male and associated terminalia and three other male specimens from the type locality.

DISTRIBUTION.—Reported from Mexico and Panama.

Culex (Culex) pipiens Linnaeus, 1758

FIGURES 27*a*, *b*

Culex (*Culex*) *pipiens* Linnaeus, 1758, p. 602.
Culex (*Culex*) *consobrinus* Robineau-Desvoidy, 1827, p. 408.
Culex (*Culex*) *pungens* Wiedemann, 1828, p. 9.
Culex (*Culex*) *fatigans* Wiedemann, 1828, p. 10.
Culex (*Culex*) *aestuans* Wiedemann, 1828, p. 11.
Culex (*Culex*) *ferruginosus* Wiedemann, 1828, p. 12.
Culex (*Culex*) *cubensis* Bigot, 1857, p. 329.
Culex (*Culex*) *serotinus* Philippi, 1865, p. 595.
Culex (*Culex*) *autumnalis* Weyenbergh, 1882, p. 23.
Culex (*Culex*) *penafieli* Williston, *in* Sanchez, 1886, p. 213.
Culex (*Culex*) *barbarus* Dyar and Knab, 1906*b*, p. 210.
Culex (*Culex*) *raymondii* Tamayo, *in* Tamayo and Garcia, 1907, p. 37.
Culex (*Culex*) *aikenii* Dyar and Knab, 1908, p. 61.
Culex (*Culex*) *revocator* Dyar and Knab, 1909a, p. 256.
Culex (*Culex*) *lachrimans* Dyar and Knab, 1909a, p. 259.
Culex (*Culex*) *dipseticus* Dyar and Knab, 1909b, p. 34.
Culex (*Culex*) *comitatus* Dyar and Knab, 1909b, p. 35.
Culex (*Culex*) *aseyehae* Dyar and Knab, 1915, p. 112.

SYSTEMATICS.—The *Culex pipiens* complex is considered by many authors to consist of two subspecies: *C. pipiens pipiens* in the northern parts of the world and *C. pipiens quinquefasciatus* in the tropics. Another subspecies, *C. pipiens australicus*, has been recognized from Australia, and two infrasubspecific forms, *molestus* and *pallens*, have been described. Mattingly et al. (1951) reviewed the complex in considerable detail, and numerous subsequent papers have discussed distributions and hybridizations among various populations of the complex. Since taxonomic characters utilized in this study are strictly morphological, all members of the complex will be grouped under the broad designation, *C. pipiens*.

Culex pipiens is a very plastic species as evidenced by over 70 synonyms, which are listed by Stone et al. (1959) for members of the complex. The various forms freely hybridize both in nature and in the laboratory and produce fertile intermediates. The male terminalia of members of the complex, however, can be readily distinguished from other species of the subgenus by the characteristic number and

distribution of appendicles on the apical lobe of the basistyle, by the short basal arm of the tenth sternite, and by the reduced mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about two and a half times as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and bluntly rounded; median rod slightly longer than basal rod and gently hooked terminally; apical rod not as broad as median and basal rods, gently hooked terminally; three accessory setae present, the one next to the apical rod is bicleft (one extension being pointed, the other hooked), next to the bicleft seta is a very strong, hooked seta, followed by the leaf; the third accessory seta as long as the leaf and gently curved; leaf moderate in size, obovate, and with distinct longitudinal striations. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm short, straight, and bluntly rounded; three to five cercal setae present. External process straight, somewhat tapered to a bluntly pointed tip; slightly exceeding the ventral cornu in length. Ventral cornu very broad and curved so as to be directed laterally; tapering to a terminal point. Median process without teeth. Basal process reduced to a short, rounded knob.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 long, multiple, barbed. Mentum with about 23 sharply pointed teeth; the apical tooth longer and broader than the lateral teeth. Body glabrous. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 4.0; four siphonal tufts inserted on the siphon beyond the pecten. Pecten with six to 13 teeth on the basal third of the siphon; each tooth with one to five coarse barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Over 300 male terminalia from throughout the New World.

DISTRIBUTION.—This complex is cosmopolitan.

Culex (Culex) pseudojanthinosoma Senevet and Abonnenc, 1946

Culex (Culex) pseudojanthinosoma Senevet and Abonnenc, 1946, p. 139.

SYSTEMATICS.—Senevet and Abonnenc (1946) described this species from larvae and adult females collected in French Guiana. Without suggesting reasons, Lane (1951) placed *Culex pseudojanthinosoma* in synonymy with *C. corniger*. Subsequently Senevet and Abonnenc (1958) revalidated the species, described the pupa, and provided a

redescription of the larva. Final placement of this species awaits the description of the male terminalia.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Unknown.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft strongly swollen at the basal third, spiculate; spicules more numerous basally. Upper frontal head hair 5 with seven long, barbed branches; lower frontal head hair 6 with eight or nine long, barbed branches; preantennal head hair 7 long, multiple. Mentum with about 21 teeth; apical tooth strong and feebly pointed; basal lateral three teeth more pointed and detached. Body glabrous. Comb with about 20 fringed scales arranged in a triangular patch of three rows. Siphonal index about 3.0; four pairs of siphonal tufts, the basal tuft single and inserted within the pecten, the subbasal tuft single, the subapical tuft single, bifurcated, and the apical tuft short, two or three branched. Pecten with five long, finely pointed teeth; each tooth with fine barbs on one side; restricted to the basal third of the siphon. Anal segment glabrous, completely ringed by the saddle.

MATERIAL EXAMINED.—None. Known to the author only from the descriptions and figures of Senevet and Abonnenc (1946 and 1958).

DISTRIBUTION.—Known only from the type locality, French Guiana.

Culex (Culex) renatoi Lane and Ramalho, 1960

FIGURES 27*c*, *d*

Culex (*Culex*) *renatoi* Lane and Ramalho, 1960, p. 173.

SYSTEMATICS.—This species is similar to *Culex mauesensis* and *C. secutor*. It is distinctive in the appendicles on the apical lobe of the basistyle and in the conformation of structures of the mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about three times as long as the basal width. Apical lobe of the basistyle prominent, undivided. Appendicles of the apical lobe as follows: basal rod strong, gently curved at the apex; median and apical rods subequal, broader and longer than the basal rod and prominently hooked distally; leaf moderate in size, pointed distally; two accessory setae present, one strong and prominently hooked, the other longer than the leaf and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length and curved; cercal setae present. External process gradually tapering to a blunt point; slightly exceeding the ventral cornu in length. Ventral cornu clavate, serrate terminally, distinctly separated from the teeth of the median process. Median process with about 14 strong, pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Antenna short; antennal hair on mesial portion. Frontal head hairs 4, 5, 6, and 7 long, multiple. Body glabrous. Comb with numerous scales in a patch. Siphonal index about 3.0; three, four, or five branched siphonal tufts beyond the pecten. Pecten with about eight pointed spines, nearly reaching the middle. Anal segment densely spiculate, completely ringed by the saddle.

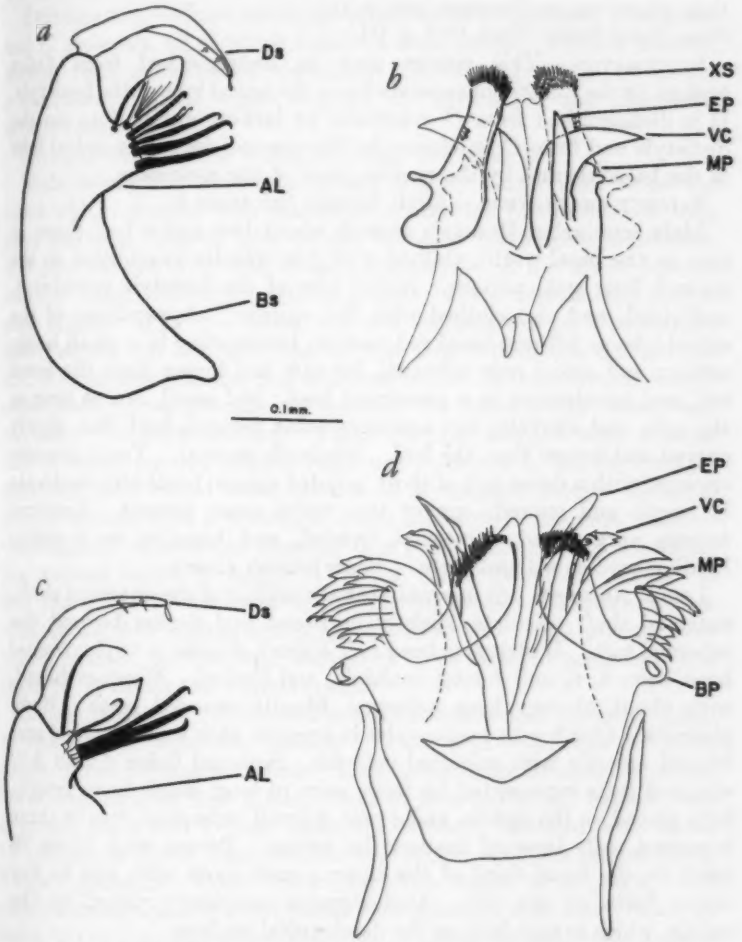

FIGURE 27.—*C. pipiens*, Bahia, Brazil, USNM RB62 166: *a*, basistyle and dististyle; *b*, mesosome. *C. renatoi* (drawn after Lane and Ramalho, 1960): *c*, basistyle and dististyle; *d*, mesosome.

MATERIAL EXAMINED.—One paratype male and associated terminalia.

DISTRIBUTION.—Known only from the type locality, Bairro de São Miguel Paulista, Capital, São Paulo, Brazil.

Culex (Culex) restuans Theobald, 1901

FIGURES 28*a*, *b*

Culex (*Culex*) *restuans* Theobald, 1901, p. 142.
Culex (*Culex*) *brehmei* Knab, 1916, p. 161.

SYSTEMATICS.—This species may be distinguished from *Culex brethesi* by the number of appendicles on the apical lobe of the basistyle. It is distinguished from *C. acharistus* by lacking annulations on the dististyle and from *C. laticlasper* by the appendicles of the apical lobe of the basistyle and by the median plate of the mesosome.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about two and a half times as long as the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine spicules. Appendicles of the apical lobe as follows: basal rod narrow, terminating in a small hook; median and apical rods subequal, broader and longer than the basal rod, and terminating in a prominent hook; leaf small, not as long as the rods, and obovate; two accessory setae present, both fine, gently curved and longer than the leaf. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length and curved; one or two cercal setae present. External process very broad, somewhat twisted, and tapering to a point. Median process without teeth. Basal process absent.

Larva: Antennal tuft inserted near the middle of the antennal shaft, antennal shaft spiculate, slightly narrowed and darker beyond the antennal tuft. Postclypeal head hair 4 short, double or triple; frontal head hairs 5, 6, and 7 long, multiple, and barbed. Mentum broad, with about 20 very long, subequal, bluntly rounded teeth. Body glabrous. Comb with many scales in a patch; each scale rounded and fringed apically with subequal spinules. Siphonal index 4.0 to 4.5; siphonal tufts represented by three pairs of long, single hairs irregularly placed on the siphon, and a pair of small, subapical, two or three branched tufts inserted beyond the pecten. Pecten with 12 to 20 teeth on the basal third of the siphon; each tooth with one to five coarse barbs on one side. Anal segment completely ringed by the saddle, which is spiculate on the dorso-apical surface.

MATERIAL EXAMINED.—A series of 25 adult males and associated terminalia from the United States.

DISTRIBUTION.—Carpenter and LaCasse (1955) reported this species from southern Canada southward to the Gulf of Mexico. Martinez Palacios (1952) reported *Culex restuans* from five states in Mexico.

Culex (Culex) salinarius Coquillett, 1904

FIGURES 28*c*, *d*

Culex (Culex) salinarius Coquillett, 1904, p. 73.

SYSTEMATICS.—*Culex salinarius* is similar to *C. archegus*, *C. dolosus*, and *C. spinosus*, all of which exhibit a basal process, which is pointed, sharply bent, and directed posteriorly. It differs, however, by having a dentiform ventral cornu and by the distinctive and diagnostic external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and blunt; median rod longer and broader than the basal rod and terminating in a prominent hook; apical rod not as broad as, but longer than the median rod and also hooked apically; leaf moderate in size, obovate; two accessory setae present, one prominently hooked, the other gently curved and pointed. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, strongly recurved; four cercal setae present in a compact group. External process broad, with a prominent knob midway on the inner surface, then slightly curved and tapering to a point; considerably exceeding the ventral cornu in length. Ventral cornu dentiform, similar in size and shape to the teeth of the median process. Median process with about five strong, sharply pointed teeth. Basal process very broad, sharply pointed, and bent so as to be directed posteriorly and reaching to about the ventral cornu.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper frontal head hair 5 long, three to six branched, barbed; lower frontal head hair 6 long, three or four branched, barbed; preantennal head hair 7 long, multiple, barbed. Mentum with about 15 teeth; the apical tooth broader and longer than the lateral teeth. Thorax glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 6.0 to 7.0; four pairs of double or triple siphonal tufts present on the siphon beyond the pecten. Pecten with 10 to 16 teeth on the basal fourth of the siphon; each tooth with two to five coarse barbs on one side. Anal segment completely ringed by the saddle.

MATERIAL EXAMINED.—Fifty-five adult males and associated terminalia from the United States.

DISTRIBUTION.—Reported from Mexico, Bermuda, and the United States and Canada, east of the Rocky Mountains.

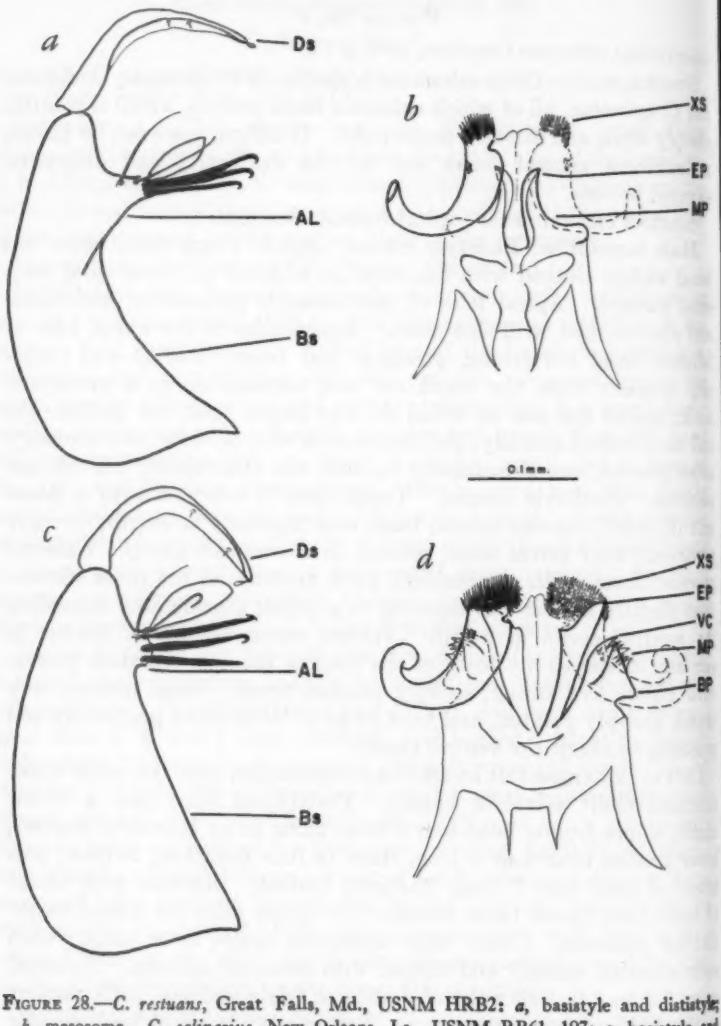

FIGURE 28.—*C. restuans*, Great Falls, Md., USNM HRB2: *a*, basistyle and dististyle; *b*, mesosome. *C. salinarius*, New Orleans, La., USNM RB61 197; *c*, basistyle and dististyle; *d*, mesosome.

Culex (Culex) saltanensis Dyar, 1928

FIGURES 29*a*, *b*

Culex (*Culex*) *saltanensis* Dyar, 1928, p. 386.
Culex (*Culex*) *beauperthuyi* Anduze, 1943b, p. 459. [New synonymy.]

SYSTEMATICS.—The holotype male terminalia of *Culex beauperthuyi* were compared with the holotype male terminalia of *C. saltanensis* and found to be conspecific. Therefore, *C. beauperthuyi* is here placed in synonymy with *C. saltanensis*.

This species is a member of the group which lacks a leaf on the apical lobe of the basistyle. It is distinguished from *Culex bonneae* by exhibiting dense pilosity on the lateral margins of the tenth sternite; it may be separated from *C. duplicator* by the distinctive ventral cornu and differences in the external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent undivided, somewhat thumblike, and also clothed with fine spicules. Appendicles of the apical lobe as follows: at the apex of the apical lobe are two subequal, strong rods which terminate in a distinct hook; surrounding these rods is a group of about 15 subequal, pointed setae; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short, pointed setae; basal arm moderate in length, prominently curved; cercal setae absent; except for the basal arm, the entire tenth sternite is clothed with fine setae. External process broad, slightly curved and gradually tapering to an obtuse termination; about twice as long as the ventral cornu. Ventral cornu very broad and curved so as to to be directed laterally; distinctly separated from the teeth of the median process. Median process with 12 or more conglomerate teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Upper and lower frontal head hairs 5 and 6 long, multiple. Mentum with about 15 teeth; the apical tooth broader and longer than the lateral teeth. Thorax and abdomen densely spiculate. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 4.5; five or six pairs of multiple siphonal tufts present on the siphon; siphon clothed with dense pilosity. Pecten with about 13 teeth on the basal third of the siphon; each tooth with one or two coarse barbs on one side. Anal segment densely spiculate, completely ringed by the saddle.

221-521—67——7

MATERIAL EXAMINED.—Four adult males and associated terminalia from Argentina, 10 from Brazil, and 4 from Venezuela. The holotype male was also studied.

DISTRIBUTION.—Reported from the Province of Salta, Argentina (the type locality). The author has seen specimens in the U.S. National Museum collection from: the Province of Tucuman, Argentina; the State of Bahia, Brazil; and the State of Zulia, Venezuela. *Culex beauperthuyi* has been reported from Venezuela, Brazil, and Panama.

Culex (Culex) scimitar Branch and Seabrook, 1959

FIGURES 29*c*, *d*

Culex (Culex) scimitar Branch and Seabrook, 1959, p. 217.

SYSTEMATICS.—In the original description Branch and Seabrook (1959) recognized the affinity of this species with *Culex nigripalpus*; however, *C. scimitar* is readily distinguished from all other members of the subgenus by the characteristic shape of the dististyle and by the apical annulations found on the dististyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width: clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed: median rod broader and longer than the basal rod, terminating in a prominent hook: apical rod longer than, but not as broad as the median rod, also terminating in a prominent hook: leaf moderate in size, obovate: one long, fine gently curved accessory seta present next to the leaf. Dististyle thick at base, widening along the inner margin to near the center where it narrows abruptly, scimitar-like in an unsclerotized area bordering the ragged fringe of the sclerotized integument: the distal third slender to the apex and bearing minute annulations along its crest. Tenth sternite crowned with a dense tuft of short, pointed spines apically and about 10 spatulate, scalelike spines on the lateral outer margins: basal arm moderate in length, gently curved: two cercal setae present. External process somewhat curved and bluntly rounded: exceeding the ventral cornu in length. Ventral cornu distinct from the teeth of the median process, truncate and serrate. Median process with three or four strong, pointed teeth. Basal process broadly spatulate.

Larva: Antennal tuft located in a constriction near the outer third: antennal shaft spiculate basally. Postclypeal head hair 4 short, single: upper frontal head hair 5 four branched, long, and barbed: lower frontal head hair 6 three branched, long, and barbed: pre-

antennal head hair 7 multiple, long, and barbed. Mentum with about 21 teeth, the apical tooth being broader and larger than the lateral teeth. Thorax and abdomen spiculate. Comb with numerous scales in a patch: each scale rounded apically and fringed with subequal spinules. Siphonal index about 5.5: four double siphonal tufts

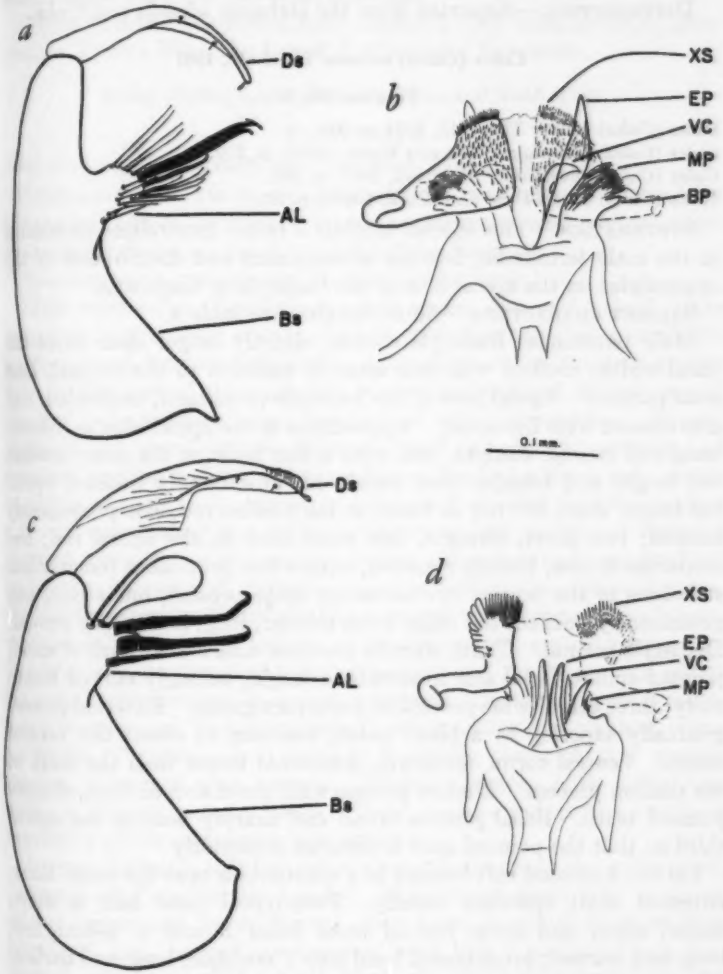

FIGURE 29.—*C. saltanensis*, Bahia, Brazil, USNM RB62 563: *a*, basistyle and dististyle; *b*, mesosome. *C. scimitar*, New Providence, Bahama Is., USNM RB62 720: *c*, basistyle and dististyle; *d*, mesosome.

inserted on the siphon beyond the pecten. Pecten with about 12 teeth on the basal third of the siphon: each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle, which is spiculate dorsolaterally.

MATERIAL EXAMINED.—The type series and nine other adult males and associated terminalia from the Bahama Islands.

DISTRIBUTION.—Reported from the Bahama Islands and Cuba.

Culex (Culex) secutor Theobald, 1901

FIGURES 30*a*, *b*

Culex (*Culex*) *secutor* Theobald, 1901, p. 321.
Culex (*Culex*) *lamentator* Dyar and Knab, 1906b, p. 219.
Culex (*Culex*) *quasisecutor* Theobald, 1907, p. 398.
Culex (*Culex*) *toweri* Dyar and Knab, 1907b, p. 13.

SYSTEMATICS.—This species exhibits a rather generalized mesosome in the male terminalia, but the arrangement and distribution of the appendicles on the apical lobe of the basistyle is diagnostic.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and with a fine hook at the apex; median rod longer and broader than basal rod, prominently hooked; apical rod longer than, but not as broad as the median rod, also prominently hooked; two short, straight, fine setae next to the apical rod; leaf moderate in size, bluntly rounded, with a few prominent longitudinal striations in the center; two accessory setae present, one strong and prominently hooked, the other more slender, long, and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, strongly curved terminally; three cercal setae present in a compact group. External process gradually tapering to a blunt point; reaching to about the ventral cornu. Ventral cornu dentiform, somewhat larger than the teeth of the median process. Median process with about five distinct, sharply pointed teeth. Basal process broad and sharply bent at the apical third so that the pointed apex is directed posteriorly.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 4-branched, long, and barbed; preantennal head hair 7 multiple, long, and barbed. Mentum with about 21 teeth, the apical tooth broader and larger than the lateral teeth. Body glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules.

Siphonal index about 4.0; six multiple siphonal tufts on the siphon, the basal tuft inserted within the pecten. Pecten with about 13 teeth on the basal third of the siphon, the apical tooth removed from the other pecten teeth; each tooth with coarse barbs on one side. Anal segment completely ringed by the saddle, which is spiculate distally.

MATERIAL EXAMINED.—Three adult males and associated terminalia from Puerto Rico and one from Jamaica.

DISTRIBUTION.—Reported from Jamaica (the type locality), Hispaniola, Puerto Rico, the Lesser Antilles, and Venezuela.

Culex (Culex) sphinx Howard, Dyar, and Knab, 1912

FIGURES 30*c*, *d*

Culex (Culex) sphinx Howard, Dyar, and Knab, 1912 [1913], p. 134.

SYSTEMATICS.—This species demonstrates close affinity with *Culex nigripalpus* but is distinctive in the arrangement and conformation of the appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about two and a half times longer than the basal width; clothed with fine spicules in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent in the area of the rods, but somewhat flattened in the area of the leaf and accessory setae; also clothed with fine spicules. Appendicles of the apical lobe as follows: basal rod straight, strong, and pointed; median rod broader and longer than the basal rod, terminating in a gentle hook; apical rod longer and broader than the median rod, also terminating in a gentle hook; two subequal, strong, straight, pointed accessory setae located between the apical rod and the leaf; leaf rather narrow and truncate, about as long as the accessory setae. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and six to nine spatulate, scalelike spines on the lateral outer margins; basal arm short and gently curved; about six cercal setae present in a compact group. External process somewhat curved and bluntly rounded; not reaching the ventral cornu in length. Ventral cornu distinct from the teeth of the median process, truncate and serrate. Median process with about six distinct, sharply pointed teeth. Basal process reduced to a bulbous expansion of the mesosome; not distinct.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 three or four branched, long, barbed; preantennal head hair 7 multiple, long, and barbed. Mentum with about 17 teeth, the apical tooth broader and larger than the lateral teeth. Thorax finely spiculate, abdomen glabrous. Comb with numerous scales in a patch; each scale rounded

apically and fringed with subequal spinules. Siphonal index about 3.0 to 3.5; three double or triple siphonal tufts inserted on the siphon. Pecten with about 20 fine teeth, restricted to the basal third of the siphon; each tooth with coarse barbs on one side. Anal segment spiculate, completely ringed by the saddle.

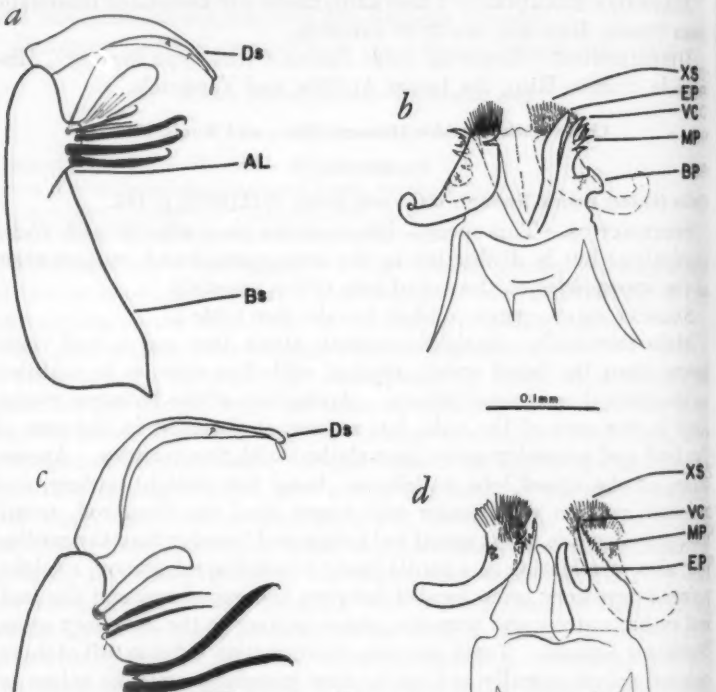

FIGURE 30.—*C. secutor*, Mayaguez, P.R., USNM RB62 356: *a*, basistyle and dististyle; *b*, mesosome. *C. sphinx*, New Providence, Bahama Is., USNM RB62 381: *c*, basistyle and dististyle; *d*, mesosome.

MATERIAL EXAMINED.—The lectotype male terminalia and six other male specimens from the Bahama Islands.

DISTRIBUTION.—Reported only from the Bahama Islands.

Culex (Culex) spinosus Lutz, 1905

FIGURES 31*a*, *b*

Culex (Culex) spinosus Lutz, 1905, p. 26.

SYSTEMATICS.—This species is a member of the *salinarius* complex. The primary distinguishing characteristic is the large, distinctive basal process. The ventral cornu and external process are also useful diagnostic characters.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and rounded terminally; median rod broader and longer than basal rod and terminating in a prominent hook; apical rod not as broad as, but longer than the median rod, also terminating in a prominent hook; leaf moderate in size, obovate, exhibiting distinct longitudinal striations; two accessory setae present, one shorter than the leaf and prominently hooked terminally, the other very long, pointed, and gently curved. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm moderate in length, gently curved; two or three cercal setae present in a compact group. External process gradually tapering to a blunt point; exceeding the ventral cornu in length. Ventral cornu dentiform, very similar in size and shape to the teeth of the median process. Median process with about four to six sharply pointed, distinct teeth. Basal process sharply pointed distally, acutely bent so as to be directed posteriorly; robust basally, but long and slender apically; reaching almost to the ventral cornu.

Larva: After Lane (1953). Antennal tuft located in a constriction near the outer third; antennal shaft spiculate. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, barbed. Body glabrous. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 4.5 to 6.0; four triple siphonal tufts inserted on the siphon beyond the pecten. Pecten with about 12 teeth on the basal third of the siphon; each tooth without coarse barbs on one side. Anal segment completely ringed by the saddle, which is densely spiculate on the entire surface.

MATERIAL EXAMINED.—Three adult males and associated terminalia from Colombia and Venezuela.

DISTRIBUTION.—Reported from Brazil. The author has seen specimens in the U.S. National Museum collection from Lagunillas, Venezuela, and from Colombia.

Culex (Culex) stenolepis Dyar and Knab, 1908

FIGURES 31*c*, *d*

Culex (Culex) stenolepis Dyar and Knab, 1908, p. 60.

SYSTEMATICS.—*Culex stenolepis* demonstrates relationship to *C. interrogator*, *C. peus*, and *C. thriambus*. It may be distinguished from the first two species by the number and arrangement of the appendicles on the apical lobe of the basistyle. It is distinct from *C. thriambus* in the conformation of the external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about twice as long as the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle somewhat flattened, undivided, and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed; median rod broader and longer than the basal rod and terminating in a gentle hook; apical rod longer than, but not as broad as the median rod, also terminating in a gentle hook; leaf moderate in size, obovate, with several prominent, longitudinal, centripetal striations; one long, pointed, gently curved accessory seta present. Dististyle normal. External process gradually tapering to a point, reaching to about the ventral cornu in length. Ventral cornu large, rounded, and rugulose. Median process with about seven sharply pointed, subequal teeth. Basal process short, straight, broad, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, and barbed. Mentum with about 23 teeth; the apical tooth broader and longer than the lateral teeth; the subbasal lateral teeth longer than the other lateral teeth. Body glabrous. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 3.5; five pairs of siphonal tufts inserted beyond the pecten, the basal four tufts double, the apical tuft multiple. Pecten with about 10 teeth, restricted to the basal third of the siphon; each tooth with several coarse barbs on one side. Anal segment completely ringed by the saddle, which is sparsely and finely spiculate distally.

MATERIAL EXAMINED.—Seven adult males and associated terminalia from Mexico. The lectotype male terminalia was also studied.

DISTRIBUTION.—Reported from Mexico and Costa Rica.

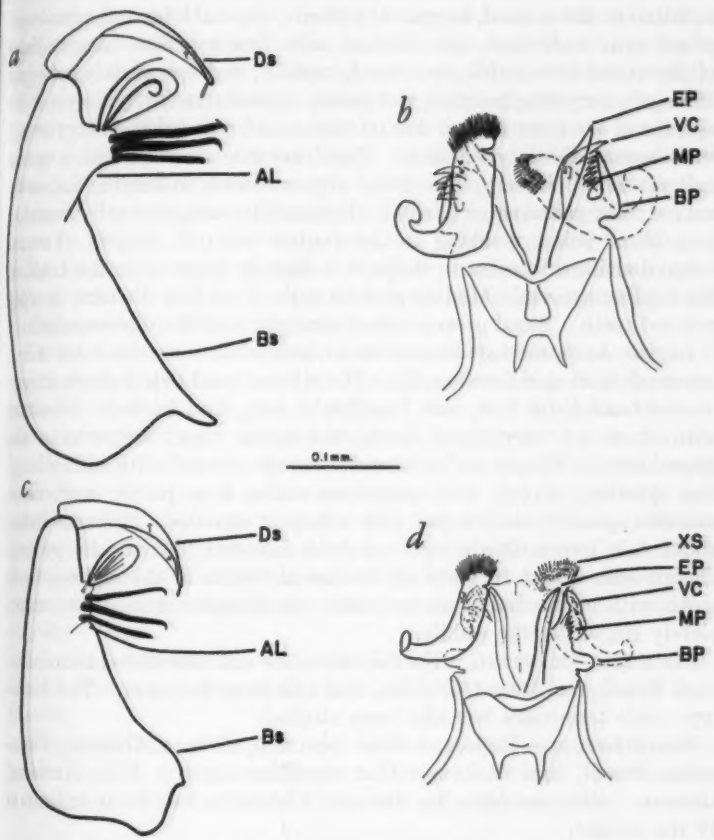

FIGURE 31.—*C. spinosus*, Lagunillas, Venezuela, USNM RB62 428: *a*, basistyle and dististyle; *b*, mesosome. *C. stenolepis*, Cordoba, Mexico, USNM RB62 714: *c*, basistyle and dististyle; *d*, mesosome.

Culex (Culex) surinamensis Dyar, 1918

FIGURES 32*a*, *b*

Culex (Culex) surinamensis Dyar, 1918b, p. 121.

SYSTEMATICS.—This species belongs to the group which lacks a leaf on the apical lobe of the basistyle. It is distinguished from its nearest relative, *Culex brevispinosus*, by possessing a dentiform ventral cornu.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with a sparse covering of very fine spicules in

addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided, also clothed with fine spicules. Appendicles of the apical lobe as follows: basal, median, and apical rods subequal in length, very fine, pointed, and gently curved terminally; beyond the apical rod are three or four fine, straight, and pointed accessory setae; leaf absent. Dististyle normal. Tenth sternite crowned with a sparse tuft of short pointed spines; basal arm moderate in length, distinctly curved; four cercal setae present. External process gradually tapering to a blunt point; reaching to the ventral cornu in length. Ventral cornu dentiform, similar in shape, but slightly larger than the teeth of the median process. Median process with about five distinct, sharply pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, and barbed. Mentum with about 11 very broad teeth, the apical tooth larger than the lateral teeth. Thorax and abdomen densely covered with rather long, fine spicules. Comb with numerous scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 4.5; five multiple siphonal tufts inserted beyond the pecten. Pecten with about 16 teeth on the basal fourth of the siphon; each tooth with coarse barbs on one side. Anal segment spiculate, completely ringed by the saddle.

MATERIAL EXAMINED.—Four adult males and associated terminalia from Brazil, one from Colombia, and one from Surinam. The lectotype male terminalia has also been studied.

DISTRIBUTION.—Reported from Surinam, French Guiana, Venezuela, Brazil, and Bolivia. One specimen in the U.S. National Museum collection from La Dorada, Colombia has been examined by the author.

Culex (Culex) tarsalis Coquillett, 1896

FIGURES 32*c*, *d*

Culex (Culex) tarsalis Coquillett, 1896, p. 43.
Culex (Culex) willistoni Giles, 1900, p. 281.
Culex (Culex) kelloggii Theobald, 1903b, p. 211.

SYSTEMATICS.—*Culex tarsalis* demonstrates close affinity with *C. abnormalis* in structures of the male terminalia, but may be distinguished by the arrangement and number of the appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided,

and also clothed with fine setae. Appendicles of the apical lobe as follows: two strong, straight, subequal, bluntly rounded rods followed by a straight, pointed seta; leaf very narrow, somewhat pointed at apex; two accessory setae present, one as long as leaf, the other broader and longer than the leaf. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines apically and about seven spatulate, scalelike spines on the lateral, outer margins; basal arm rather long, distinctly curved; eight to 10 cercal setae present in a large patch on the lateral margin. External process rather narrow, gradually tapering to a blunt point; slightly exceeding the ventral cornu in length. Ventral cornu long and narrow, similar in size and shape to the external process. Median process with three to five strong, pointed, distinctly separated teeth. Basal process long, thin, straight, and bluntly rounded at the apex.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, and barbed. Mentum with about 13 sharply pointed teeth; the apical tooth is longer and broader than the lateral teeth. Thorax glabrous. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index 4.5 to 5.5; five multiple siphonal tufts inserted in a line beyond the pecten. Pecten with 10 to 15 teeth on the basal third of the siphon; each tooth with one to five coarse barbs on one side. Anal segment completely ringed by the saddle, spiculate distally.

MATERIAL EXAMINED.—A series of over 50 specimens from the United States and five adult males and associated terminalia from Mexico.

DISTRIBUTION.—Carpenter and LaCasse (1955) reported that this species ranges from southwestern Canada through the western, central, and southern United States and into Mexico.

Culex (Culex) thriambus Dyar, 1921

FIGURES 33*a*, *b*

Culex (Culex) thriambus Dyar, 1921a, p. 33.

SYSTEMATICS.—This species demonstrates affinities with *Culex peus*, *C. interrogator*, and *C. stenolepis*. It may be distinguished by the number and arrangement of appendicles on the apical lobe of the basistyle and by its characteristic and diagnostic external process.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, slightly longer than twice the basal width; clothed with fine setae in addition to the normal, long setal pattern. Apical lobe of the basistyle prominent, undivided,

and also clothed with fine setae. Appendicles of the apical lobe as follows: basal rod strong, straight, and pointed; median rod longer and broader than the basal rod and terminating in a gentle hook; apical rod not as broad as, but longer than the median rod, also terminating in a gentle hook; leaf moderate in size, obovate, exhibiting distinct longitudinal striations; one long, pointed, gently curved accessory seta present. Dististyle normal. Tenth sternite crowned

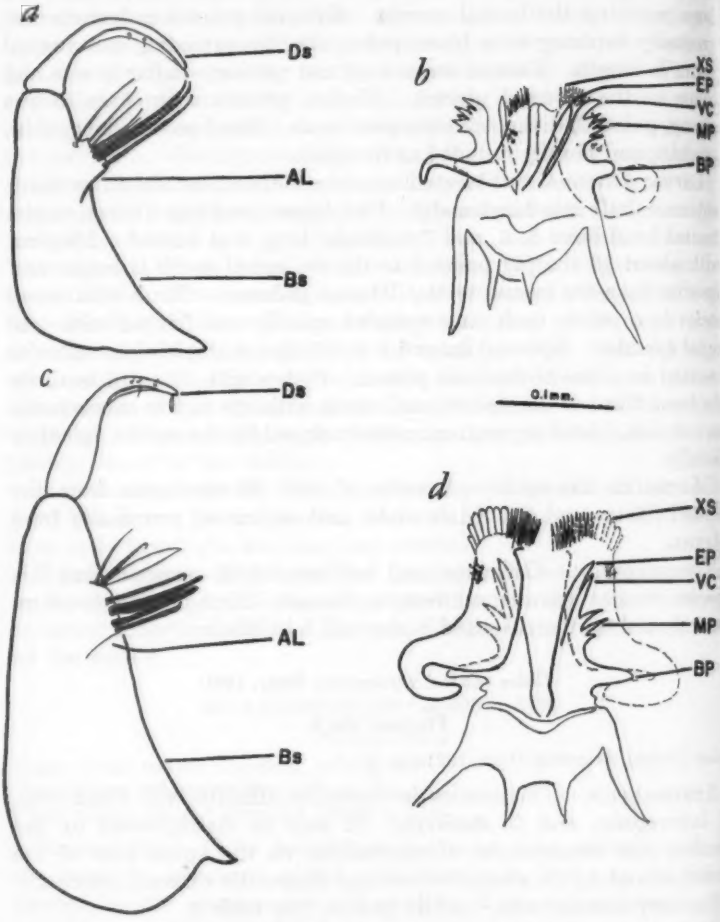

FIGURE 32.—*C. surinamensis*, Bahia, Brazil, USNM RB62 651: *a*, basistyle and dististyle; *b*, mesosome. *C. tarsalis*, Federal District, Mexico, USNM RB62 706: *c*, basistyle and dististyle; *d*, mesosome.

with a dense tuft of short, pointed spines; basal arm moderate in length, prominently curved; three cercal setae present in a compact group. External process broad on the proximal half, then sharply tapering to a point which reaches slightly beyond the ventral cornu; a prominent additional sclerite on the inner margin of the proximal half. Ventral cornu large, rounded and rugulose. Median process with four to six distinct, sharply pointed teeth. Basal process short, straight, and bluntly rounded.

Larva: Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally. Postclypeal head hair 4 short, single; frontal head hairs 5, 6, and 7 multiple, long, and barbed. Mentum with about 17 teeth; the apical tooth longer and broader than the lateral teeth; subbasal lateral teeth longer than other lateral teeth. Thorax glabrous. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules. Siphonal index about 6.0; four siphonal tufts consisting of single setae inserted beyond the pecten. Pecten with about 10 to 14 teeth on the basal third of the siphon; each tooth with one to four coarse barbs on one side. Anal segment completely ringed by the saddle which has several fine spicules distally.

MATERIAL EXAMINED.—Five adult males and associated terminalia from Costa Rica, one from Colombia, one from the Dominican Republic, and three from the United States. The lectotype male terminalia was also studied.

DISTRIBUTION.—Reported from the southwestern United States, Mexico, and Panama. The author has seen specimens in the U.S. National Museum collection from: Santa Anna, Costa Rica; Barahona, Santo Domingo, Dominican Republic; and Catera al Colegio, Bogotá, Colombia.

Culex (Culex) tramasayguesi Duret, 1954

FIGURE 33*c*

Culex (Culex) tramazayguesi Duret, 1954, p. 23.

SYSTEMATICS.—Examination of Duret's (1954) original figures and description of this species suggests the possibility that it is not a member of the subgenus *Culex*, however, since actual specimen have not been examined, the species is considered a member of the subgenus for purposes of this study.

Culex tramazayguesi is readily distinguished from all other members of the subgenus by the characteristic shape and number of the appendicles on the apical lobe of the basistyle.

SALIENT CHARACTERS.—Adult female: See table 1.

Male terminalia: Basistyle conical, about twice as long as the basal width. Apical lobe of the basistyle prominent, divided into two sec-

tions: the proximal section is conical and possesses two robust, heavily sclerotized, bluntly rounded rods: the distal section is also conical, but possesses only one heavily sclerotized, bluntly rounded rod: numerous setae are also present on the apical lobe. Dististyle normal. Tenth sternite crowned with a dense tuft of short, pointed spines; basal arm short and straight; about eight cercal setae present. Ex-

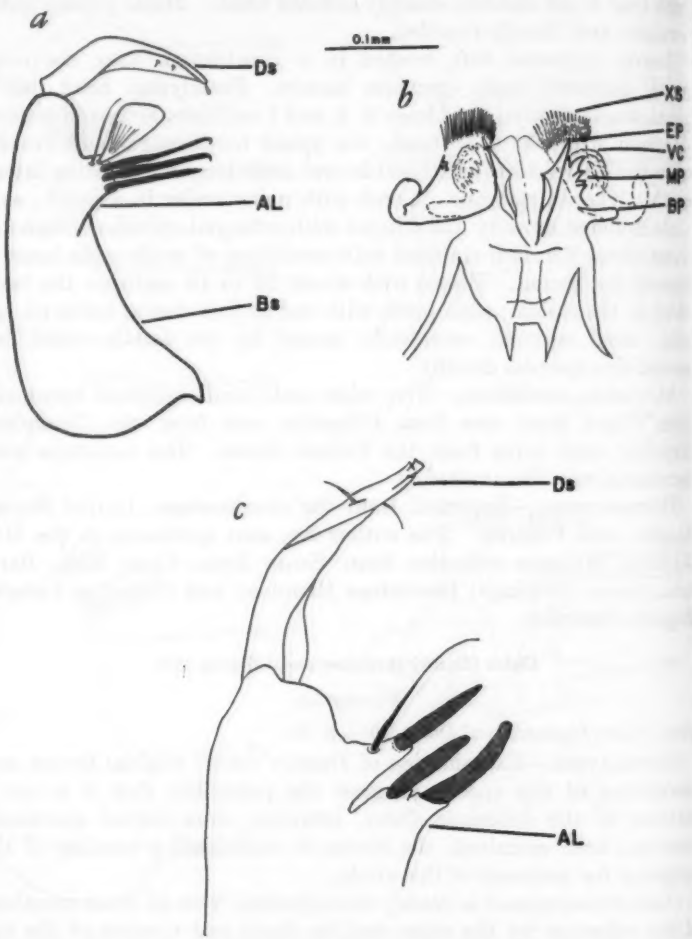

FIGURE 33.—*C. thriambus*, Santa Anna, Costa Rica, USNM RB62 73: *a*, basistyle and dististyle; *b*, mesosome. *C. tramazayguesi* (drawn after Duret, 1954): *c*, apical lobe of basistyle and dististyle.

ternal process gradually tapering to a blunt point. Ventral cornu absent. Median process without teeth. Basal process absent.

Larva: Unknown.

MATERIAL EXAMINED.—None. Known to the author only from the original description.

DISTRIBUTION.—Known only from the type locality, Monte Coman, Mendoza, Argentina.

Unrecognized Species

Culex (Culex) virgultus Theobald, 1901

Culex (Culex) virgultus Theobald, 1901, p. 123.

Following the recommendation of Stone (1956 [1957]), *Culex virgultus* is considered an unrecognized species in the present study.

Culex (Culex) guayasi Levi-Castillo, 1953

Culex (Culex) guayasi Levi-Castillo, 1953, p. 15.

In the original description, Levi-Castillo (1953) described the female and included figures of the male terminalia. I have been unable to utilize the generalized descriptions in keys or otherwise distinguish this species from other members of the subgenus. Since type specimens are not available for study, *Culex guayasi* is here considered as an unrecognized species.

Culex (Culex) quitensis Levi-Castillo, 1953

Culex (Culex) quitensis Levi-Castillo, 1953, p. 190.

As mentioned above for *C. guayasi*, the generalized original description of this species is not sufficient for absolute recognition. Since type specimens are not available for study, *C. quitensis* is here considered as an unrecognized species.

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TABLE 1.—*Salient female characters of New World species of the* Culex *subgenus* Culex (O=character absent; X=character present; ?=presence or absence of character unknown to author)

	Abdominal bands with caudally directed V	Abdominal segments with broad white basal bands	Abdominal segments with narrow white basal bands	Last hind tarsal segment entirely white	Tarsal segments with white bands	Tibia with pale apical band	Femur with pale apical band	Wings with scattered white scales on costa and subcosta	Scutellum with white scales or setae	Pleura with patches of white scales	Mesonotum with pattern of silver scales	Palpi with white markings	Proboscis ringed with a white band
abnormalis	O	O	X	O	O	X	X	O	X	X	X	O	O
acharistus	?	X	O	O	O	X	X	O	O	?	X	O	O
airezai	O	O	X	O	X	X	X	O	O	X	O	O	X
apicinus	O	X	O	O	O	X	O	X	X	?	X	O	O
archegus	O	O	X	O	O	X	X	O	X	X	O	O	O
articularis	O	O	X	O	O	X	X	O	O	X	O	O	O
bahamensis	X	O	X	O	X	X	X	O	X	X	X	X	X
bidens	X	O	X	O	X	X	X	O	X	X	O	O	O
bonneae	O	O	X	O	O	X	X	O	X	X	O	O	O
brethesi	O	O	X	O	X	X	X	O	X	O	O	O	O
brevispinosus	O	O	O	O	O	X	X	O	X	X	O	O	O
carcinozenus	O	O	X	O	O	O	X	O	X	X	X	O	O
chidesteri	O	O	X	O	O	X	X	O	X	X	O	O	X
corniger	O	O	X	O	X	X	X	O	X	X	X	O	X
coronator	O	X	O	O	X	X	X	O	X	X	O	O	O
declarator	X	O	X	O	X	X	X	O	X	X	O	O	O
delys	O	O	O	O	O	O	X	O	O	X	O	O	O
diplophyllum	O	X	O	O	O	O	X	O	X	X	O	O	O
delaeus	O	X	O	O	X	X	O	?	?	?	O	O	?
duplicator	X	O	X	O	X	O	O	O	X	X	O	O	O
erythrothorax	O	O	X	O	O	O	O	O	O	X	O	O	O
finlayi	O	O	X	O	X	X	X	O	?	X	O	O	X
foliaceus	O	O	X	O	O	X	X	O	O	X	X	O	O
habilitator	O	O	X	O	X	X	O	O	?	X	O	O	X
inflictus	O	O	O	O	O	X	X	O	?	O	O	O	O
interrogator	O	O	X	O	O	X	X	O	O	X	O	O	O
janitor	O	O	O	O	X	O	O	O	X	?	O	O	O
lahillei	O	O	X	O	X	X	X	X	X	X	X	O	O
laticlasper	O	O	O	O	O	X	X	O	X	X	O	O	O
levicastilloi	O	O	X	O	X	X	O	O	X	X	O	X	O
lygrus	O	X	O	O	X	O	O	O	?	?	O	O	O
maracayensis	O	O	X	O	X	X	X	O	X	X	O	O	X
mauesensis	O	O	X	O	X	X	X	O	X	X	O	O	O
mazi	O	O	O	O	X	X	X	X	X	O	O	O	X
mollis	O	O	O	O	X	X	X	X	X	X	O	O	O
nigripalpus	O	O	X	O	O	O	O	O	O	O	O	O	O
peus	X	O	X	O	X	X	X	X	X	X	X	X	X

TABLE 1.—*Salient female characters of New World species of the* Culex *subgenus* Culex—Continued

	Abdominal bands with caudally directed V	Abdominal segments with broad white basal bands	Abdominal segments with narrow white basal bands	Last hind tarsal segment entirely white	Tarsal segments with white bands	Tibia with pale apical band	Femur with pale apical band	Wings with scattered white scales on costa and subcosta	Scutellum with white scales or setae	Pleura with patches of white scales	Mesonotum with pattern of silver scales	Palpi with white markings	Proboscis ringed with a white band
pinarocampa	0	0	X	X	X	X	X	0	X	X	X	0	0
pipiens	0	0	X	0	0	X	X	0	X	X	0	0	0
pseudojanthinosoma	0	0	X	0	X	0	0	0	X	X	0	X	X
renatoi	0	0	0	0	X	X	X	0	X	X	X	X	X
restuans	0	X	0	0	0	X	X	0	X	X	X	0	0
salinarius	0	0	X	0	0	0	0	0	X	X	0	0	0
scimitar	0	0	X	0	0	X	0	0	0	X	0	0	0
secutor	0	0	X	0	X	X	X	0	X	X	0	0	0
sphinx	0	0	X	0	0	X	X	0	X	X	0	0	0
spinosus	0	0	0	0	0	X	X	0	X	X	0	0	0
stenolepis	0	0	X	X	X	X	X	0	X	X	0	0	0
surinamensis	0	X	0	0	X	X	X	0	?	?	0	0	0
tarsalis	0	0	X	0	X	X	X	X	X	X	X	X	X
thriambus	0	0	X	X	X	X	X	0	0	X	0	0	0
tramazayguesi	0	0	X	X	X	X	X	X	X	X	0	0	X
usquatissimus	0	X	0	0	X	X	X	0	X	X	0	0	0
usquatus	0	X	0	0	X	X	X	0	X	X	0	0	0

TABLE 2.—*Terminology used in describing structures of the mesosome in* Culex (Culex) (*=variation in use of the term within the paper under consideration.)

Source	Structures				
Freeborn and Bohart (1951)	External process	Ventral cornu	Median process	Basal process	Mesosome
Carpenter and LaCasse (1955)	Dorsal arm *	Ventral arm *	Lateral teeth of phallosome	not named *	Phallosome
	Ventral arm *	not named *	Lateral teeth of phallosome	Dorsal arm *	Phallosome
Lane (1953)	Upper horn *	Upper horn *	Teeth of mesosome	Lateral horn of mesosome	Mesosome
Dyar (1928)	Upper arm	Upper limb	Teeth of mesosome	Lower arm	Mesosome
Martinez Palacios (1950)	Apendice del borde interno	Primer diente apical	Dientes apicales	Apifisis dorsal	Mesosoma
Roth (1943)	Ventral arm	not named	Teeth of mesosome	Dorsal arm	Mesosome
Bohart and Ingram (1946)	External process	Ventral cornu	Median process	Basal angle	Mesosome
Matheson (1944)	Upper arm	Apical tooth of outer plate	Outer plate	Lower arm	Mesosome
Natvig (1946)	Dorsal sclerite	Ventral sclerite	Median sclerite	Median sclerite	Phallosome
Belkin[2] (1962)	Inner division	Tergal arm	Outer division	Lateral arm of the outer division	Phallosome

TABLE 3.—*Distributional analysis of the species in the* Culex coronator *complex*

Area	Number of Specimens Studied					
	c. coronator	*c. usquatus*	*c. camposi*	*c. ousqua*	*c. usquatissimus*	Total
I	7	0	0	0	0	7
II	43	3	0	7	0	53
III	11	1	0	12	3	27
IV	2	5	14	1	4	26
V	8	13	0	0	2	23
VI	3	3	0	0	0	6
VII	4	23	0	0	0	27
VIII	26	1	0	0	0	27
IX	0	2	4	0	0	6
X	0	0	24	0	1	25
Total	104	51	42	20	10	227

Addendum

Culex (*Culex*) *fernandezi* Casal, Garcia, and Cavalieri (1966, Physis, vol. 26, pp. 185–192): In the key to species based on male terminalia, *C. fernandezi* would key to couplet 49, but differs from *C. salinarius* in the development of the external process. In the key to species based on the larva, *C. fernandezi* would key to the vicinity of couplet 16; however, features of the chaetotaxy, particularly the stellate thoracic and abdominal setae, are quite distinctive. This species is known from the Province of Salta, Argentina, and the larvae were collected exclusively from bromeliads.

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